

Sustainability

A HOLISTIC APPROACH

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ECO-ARCHITECTURE:
A HOLISTIC APPROACH TO SUSTAINABILITY

A DESIGN THESIS SUBMITTED TO THE
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Table Of Contents

01	COVER PAGE
02	THESIS TITLE
05	CONTENTS
06	ABSTRACT
07	PROBLEM STATEMENT
08	STATEMENT OF INTENT
10	THE NARRATIVE
12	USER/CLIENT DESCRIPTION
19	MAJOR PROJECT ELEMENTS
15	SITE INFORMATION
16	PROJECT EMPHASIS
17	A PLAN FOR PROCEEDING
18	PREVIOUS STUDIO EXPERIENCE
20	RESULTS FROM THE THEORETICAL PREMISE/UNIFYING IDEA RESEARCH
26	SUMMARY OF RESULTS
28	CASE STUDIES
48	HISTORICAL CONTEXT
54	THESIS GOALS
57	SITE PERFORMANCE ANALYSIS
91	MEETING NOTES
99	PROCESS
120	FINAL BOARDS
130	REFERENCES
132	PERSONAL INFORMATION

ABSTRACT:

MAN’S RELATIONSHIP WITH NATURE STARTED AS A MUTUAL RELATIONSHIP WHICH SLOW-
LY DEVELOPED INTO MAN VS. NATURE. THIS ALTERING IDEOL- OGY HAS DEVELOPED
HUMANS TO BELIEVE THEY ARE SUPERIOR TO NATURE. RATHER THAN LIVING IN HAR-
MONY WITH NATURE, MAN IS NOW CHALLENGING NATURE. MAN HAS BECOME SO SELF-
CENTERED THAT HE HAS FORGOTTEN THAT HE IS NATURE, AND BY EXPLOITING NATURE
HE IS ULTIMATELY DESTROYING HIMSELF.

KEYWORDS:

SUSTAINABILITY, PERFORMANCE, ECONOMICS, AESTHETICS.

PROBLEM STATEMENT

CAN SUSTAINABLE DESIGN BE
UGLY?

STATEMENT OF INTENT

TYPOLGY

LIBRARY

CLAIM- SUSTAINABLE DESIGN INCLUDES THE RELATION OF PERFORMANCE,CULTURE ECO-NOMICS AND AESTHETICS.

WHO IS THE ACTOR(S)? PERFORMANCE, ECONOMICS AND AESTHETICS

WHAT IS THE ACTION? BALANCE

WHAT OR WHO IS THE OBJECT (ACTED UPON)? ECOLOGIAL DESIGN

IS THERE A MANNER TO THE ACTION AND IF SO WHAT IS IT? THROUGH QUAN-TIFIED MODELING METHODS-SUSTAINABILITY,COST AND AESTHETICS.

PREMISES

HOW IS THE ACTOR RELATED TO THE CLAIM? PERFORMANCE,CULTURE, ECONOMICS AND AESTHETICS ARE PRIMARY COMPONENTS OF SUSTAINABLE DESIGN.

HOW IS THE ACTION RELATED TO THE CLAIM? IN ORDER TO BE SUSTAINABLE, THESE THREE THINGS MUST BE BALANCED OR CLOSELY RELATED. THE CLOSER THEY ARE, THE MORE SUSTAINABLE THE RELATION WILL BE.

HOW IS THE OBJECT (ACTED UPON) RELATED TO THE CLAIM? SUSTAINABLE DE-SIGN IS DEFINED BY THESE THREE THINGS. IN MEASURES, THESE THINGS HAVE TO BE FACTORS OF SUSTAINABLE DESIGN.

CONCLUSION:

SUSTAINABLE DESIGN HAS BEEN CRITICIZED FOR ACKNOWLEDGING ONLY BUILDING PER-FORMANCE AND OVERLOOKING THE AESTHETIC RESPONSE. AS JASON MCLENNAN SAYS, "IF SUSTAINABLE DESIGN CAN BE BUILT IN ANY STYLE AND APPEAL TO ANY PERSON REGARDLESS OF AESTHETIC PREFERENCE, THEN WHY IS THERE A NEED TO DISCUSS AESTHETICS AND BEAUTY WITH THE PHILOSOPHY? IF IT'S NOT BEAUTIFUL IT'S NOT SUSTAINABLE" (MCLENNAN, 2004).

JUSTIFICATION:

MOST OF THE GREEN BUILDINGS BUILT TODAY ARE HIGHLY DOMINATED BY BUILDING PERFORMANCE COST. GREEN BUILDINGS LACK THE BALANCE BETWEEN PERFORMANCE, ECONOMICS, AND AESTHETICS. "BEAUTY INSPIRES US TO DREAM AND SEEK SOLUTIONS TO PROBLEMS THAT HAVE YET TO BE SOLVED" (MCLENNAN, 2004).

NARRATIVE

SUSTAINABLE DESIGN IS THE MEANS TO SUPERIOR LIVING. A DESIGN THAT GROWS FROM NATURE, AND MERGES BACK TO NATURE. IT WAS BELIEVED THAT THE CONCEPT OF SUSTAINABILITY CAME UP WITH PASSIVE SOLAR DESIGN PRIMARILY TO SAVE ENERGY. IT IS TRUE THAT GREEN DESIGN HAS EXISTED SINCE ANCIENT TIMES, BUT IN THE PRESENT, SCIENCE AND TECHNOLOGY HAVE OCCUPIED A MAJOR SPACE WHICH HAS ALMOST NEGLECTED THE SUSTAINABLE CONCEPT. THERE ARE A LOT OF PEOPLE WHO BELIEVE THAT THE CONCEPT OF SUSTAINABILITY WAS INTRODUCED IN THE 1970'S WITH PASSIVE SOLAR DESIGN PRIMARILY TO CONSERVE ENERGY. THE IDEA WAS BROUGHT BACK IN 2000 AS ENERGY PRICES STARTED INCREASING AND ENVIRONMENTAL PROBLEMS BECAME EVIDENT. PASSIVE SOLAR BUILDING DESIGNS REDUCED ENERGY COSTS, BUT BECAUSE OF A LACK OF AESTHETIC VALUE IT LOST MARKET SHARE. JAMES WINES COMMENTS, "SO WHY IS THERE A BELIEF BY MANY THAT SUSTAINABLE DESIGN AND BEAUTY ARE AT ODDS?" (WINES, 2000) THIS IS A VERY CONTROVERSIAL STATEMENT AND MAY RAISE QUESTIONS ABOUT, WHAT BEAUTY IS, OR IF BEAUTY IS EVEN REQUIRED FOR A BUILDING TO BE SUSTAINABLE. MANY PEOPLE INCLUDING ME BELIEVE THAT GREEN DESIGN TENDS TO BECOME UGLY. IT IS THE LINE THAT WE DRAW BETWEEN ESSENTIAL AND OVERDONE THAT MAKES A BUILDING BEAUTIFUL OR UGLY. CERTAINLY THE BEGINNING OF EARLIEST ARCHITECTURAL EXAMPLES OF ENVIRONMENTALLY RESPONSIBLE DESIGN IN THE 1960'S SET ITS CHARACTER AS BEING CLASSIFIED AS 'UGLY'. HOWEVER, BEAUTY STILL REMAINS A SIGNIFICANT ELEMENT OF ARCHITECTURE AND THE QUESTION OF WHAT IS BEAUTIFUL COULD BE ARGUED REPEATEDLY WITHOUT ANY CONCLUSION.

NOT UNTIL THE LATE 2000'S DID ARCHITECTS BEGIN RETHINKING SUSTAINABLE DESIGN, PRIMARILY BECAUSE OF SUSTAINABLE NATURE AND IN AN EFFORT TO REDUCE A NEGATIVE ENVIRONMENTAL IMPACT. THE PROBLEM FACED DURING THESE TIMES WAS THAT SUSTAINABILITY WAS SEEN AS A QUANTITATIVE APPROACH, AN AFTERTHOUGHT, OR SOMETHING SLAPPED ON LATER. DUE TO THIS, EVEN THE MOST ENERGY EFFICIENT BUILDINGS WERE NOT ARCHITECTURALLY PLEASING. SUSTAINABLE DESIGN INCLUDES THE RELATION OF PERFORMANCE, CULTURE, ECONOMICS, AND AESTHETICS. THE IDEA HERE IS TO MAKE ARCHITECTURE FIT INTO ITS ECOLOGICAL, CULTURAL, AND MORAL CONTEXT. THE CONCEPT OF SUSTAINABILITY IS IMMENSE; IT IS VERY IMPORTANT TO ADDRESS THIS ISSUE IN THE BEGINNING OF ANY DESIGN PHASE. AS VICTOR PAPANEK SAYS, "THE CHALLENGE OF SUSTAINABLE DESIGN IS TOO BIG, TOO COMPLEX, AND TOO UNCERTAIN TO DEAL WITH AS A TECHNICAL PROBLEM OR EVEN AS AN EXERCISE IN INSTITUTIONAL DESIGN" (PAPANEK, 1971).

USER/CLIENT DESCRIPTION

THE LIBRARY WILL BE THE NEW MAIN LIBRARY FOR THE STUDENTS OF NORTH DAKOTA STATE UNIVERSITY. ITS MAIN USERS WILL BE NDSU STUDENTS AND ANY RESIDENT WHO WANTS TO ACCESS THE LIBRARY FOR ITS RESOURCES.

NDSU, THE SECOND LARGEST UNIVERSITY IN NORTH DAKOTA STATE WITH ABOUT 14000 STUDENTS, LACKS A PROPER LIBRARY BUILDING. THE CURRENT MAIN LIBRARY IS BUILT TO SERVE HALF OF ITS POPULATION. NDSU CONTINUES TO RANK LAST AMONGST ITS PEER INSTITUTIONS IN TERMS OF BUDGET, MATERIAL EXPENDITURE, SALARY, AND OPERATING EXPENDITURE.

THE PROPOSED NEW MAIN LIBRARY WILL QUALITATIVELY REINFORCE THE ESSENCE OF HAVING A LIBRARY, WHERE THE DIGITAL REVOLUTIONS ARE TAKING OVER MIND AND BODY, THE NEW LIBRARY WILL FOCUS ON BRINGING BACK INTERACTIVE LEARNING EXPERIENCE.

PEAK USAGE: THE LIBRARY WILL BE USED 24 HOURS AND A DAY, 7 DAYS PER WEEK.

PARKING REQUIREMENT: PARKING WILL BE PROVIDED AS PER THE CODE'S REQUIREMENT.

SPECIAL SOCIAL, CULTURAL, ETHNIC GROUPS: NDSU IS VERY DIVERSE IN TERMS OF ITS STUDENT'S POPULATIONS; ABOUT 8% OF ITS STUDENTS ARE FOREIGNERS.

MAJOR PROJECT ELEMENTS

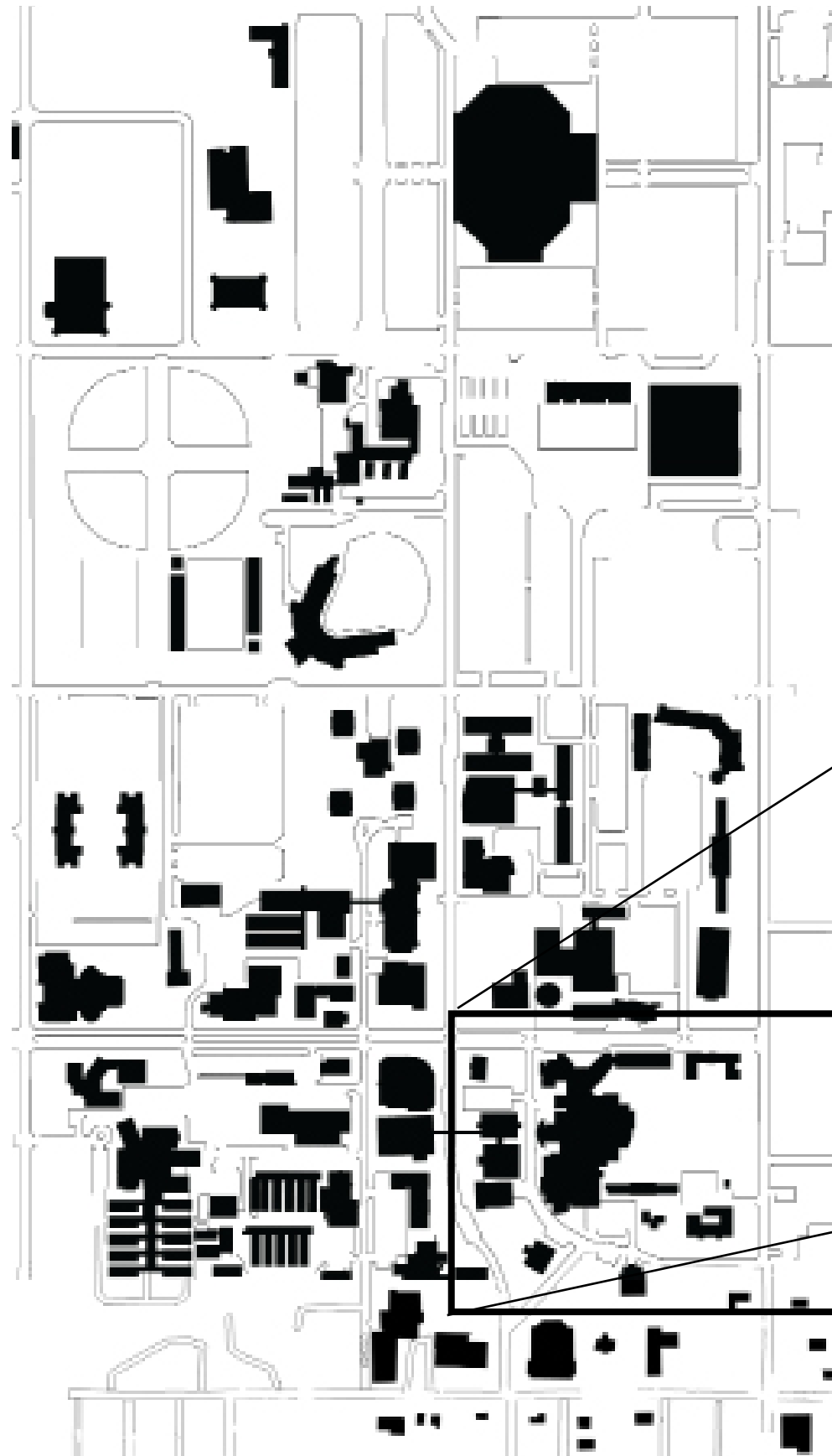
COLLECTION SPACE: SPACE FOR BOOKS, MAGAZINES, PERIODICALS, MUSIC, AND FILMS WILL BE PROVIDED.

READER SEATING SPACE: SMALL READING/STUDY NOOKS WILL BE INCORPORATED THROUGHOUT THE DESIGN IN ORDER TO PROVIDE PATRONS WITH TRANQUIL SPACES TO READ AND/OR STUDY.

STAFF WORK SPACE: STAFF LOUNGES, A RECEIVING AREA, CHECK-OUT AREAS, AND OFFICES WILL BE PROVIDED IN ORDER TO SERVE STAFF NEEDS.

MEETING ROOM SPACE: MEETING SPACES WILL BE MADE AVAILABLE TO OUTSIDE GROUPS WHO NEED A PLACE TO GATHER AND DISCUSS, PRESENT MEDIA, PERFORM WORKSHOPS, ETC.

DIGITAL ACCESS: SPACES ALLOWING ACCESS TO DIGITAL EQUIPMENT WILL BE MADE AVAILABLE FOR ALL PATRONS.



SITE INFORMATION

MACRO

FARGO IS THE LARGEST CITY OF THE STATE OF NORTH DAKOTA WITH A CURRENT POPULATION OF 105,549. FARGO IS SITUATED AT $46^{\circ} 52'' 38''$ N, $96^{\circ} 47'' 22''$ W IN THE UPPER-MID PART OF THE UNITED STATES. IT IS ADJOINED THE CITY OF MOORHEAD, MINNESOTA.

MICRO

THE SITE FOR THE PROJECT IS LOCATED ON NDSU'S MAIN CAMPUS EAST OF THE MEMORIAL UNION. THIS SPACE IS REGARDED AS ONE OF THE GREEN SPACES OF THE CAMPUS. THE ACCESSIBILITY OF THE SITE FROM MANY BUILDINGS ON CAMPUS IS WHAT JUSTIFIES IT, ESPECIALLY IN A PLACE WHERE THE SEMESTER-AVERAGE TEMPERATURE IS BELOW FREEZING.



SITE IMPORTANCE

CHURCHILL FIELD IS A CENTRALIZED LOCATION ON CAMPUS. THE CENTRALIZED POSITION OF THE LIBRARY WILL PROVIDE EASY ACCESS TO THE SURROUNDING DORMITORIES, THE MEMORIAL UNION, THE FAMILY LIFE CENTER, THE DEPARTMENT OF HUMAN DEVELOPMENT, AND VARIOUS OFF-CAMPUS APARTMENTS.

PROJECT EMPHASIS

SUSTAINABLE DESIGN THAT EXAMINES/ INCLUDES THE RELATION OF PERFORMANCE, CULTURE, ECONOMICS AND AESTHETICS:

THE THESIS AIMS TO ESTABLISH THE LIBRARY AS AN IMPORTANT PHYSICAL PLACE WITHIN THE CAMPUS AND ITS PROPOSAL USING THE SUSTAINABLE DESIGN PRINCIPLE.

ARCHITECTURE THAT IS MEANINGFULLY SUSTAINABLE: THE IDEA IS TO CREATE A DESIGN THAT LOGICALLY JUSTIFIES BOTH QUANTITATIVE AND QUALITATIVE ASPECTS OF SUSTAINABLE DESIGN.

A PLAN FOR PROCEEDING

IN-DEPTH SITE ANALYSIS WILL BE CONDUCTED TO FIGURE OUT THE BEST POSSIBLE SUSTAINABLE SITE FOR THE BUILDING. ENERGY MODELING WILL BE CONDUCTED FOR REQUIRED VOLUMETRIC SPACE IN VARIOUS AVAILABLE SITE LOCATIONS. SUSTAINABILITY WILL BE MEASURED IN TERMS OF ACCESSIBILITY, AVAILABLE SPACE, AND ENERGY PERFORMANCE. THE MOST SUSTAINABLE BUILDING WILL THEN BE REVIEWED FOR ZONED-ENERGY ANALYSIS. BIM SOFTWARES WILL BE USED TO ANALYZE QUANTITATIVE AND QUALITATIVE DATA THAT WILL HELP THE PROCEEDINGS OF THE PROJECT.

DOCUMENTATION OF THE DESIGN PROCESS WILL BE RECORDED USING VARIOUS MEDIUMS. SKETCHING, WRITINGS, ANIMATIONS, AND PHOTOGRAPHY WILL BE SOME OF THE KEY METHODS. THE DESIGN PROCESS STARTING WITH ENERGY MODELING, SCHEMATIC DESIGN AND FOLLOWING WITH DESIGN DEVELOPMENT WILL BE RECORDED. THE PHYSICAL MODEL WILL BE DOCUMENTED THROUGH PHOTOGRAPHY.

STUDIO EXPERIENCE

SECOND YEAR

FALL 2007 - JOAN VORDERBRUGGEN

- TEA HOUSE - FARGO, ND
- ROWING CLUB - MINNEAPOLIS, MN

SPRING 2008 - DARRYL BOOKER

- COMMUNITY HOUSING - FARGO, ND
- DANCE STUDIO - FARGO, ND

THIRD YEAR

FALL 2009 - PAUL GLEYE

- CENTER FOR FUTURE STUDIES - FARGO, ND
- MEMORIAL UNION - FARGO, ND

SPRING 2010 - DAVID CRUTCHFIELD & MIKE

CHRISTENSON

- PERFORMING ARTS CENTER - AUSTIN, TX
- ITERATIONS - EAGAN, MN

FOURTH YEAR

FALL 2010 - FRANK KRATKY & DON FAULKNER

- HIGH RISE/VERTICAL COMMUNITY - SAN FRANCISCO, CA
- KKE COMPETITION

SPRING 2011 - FRANK KRATKY, DARRYL BOOKER, PAUL GLEYE

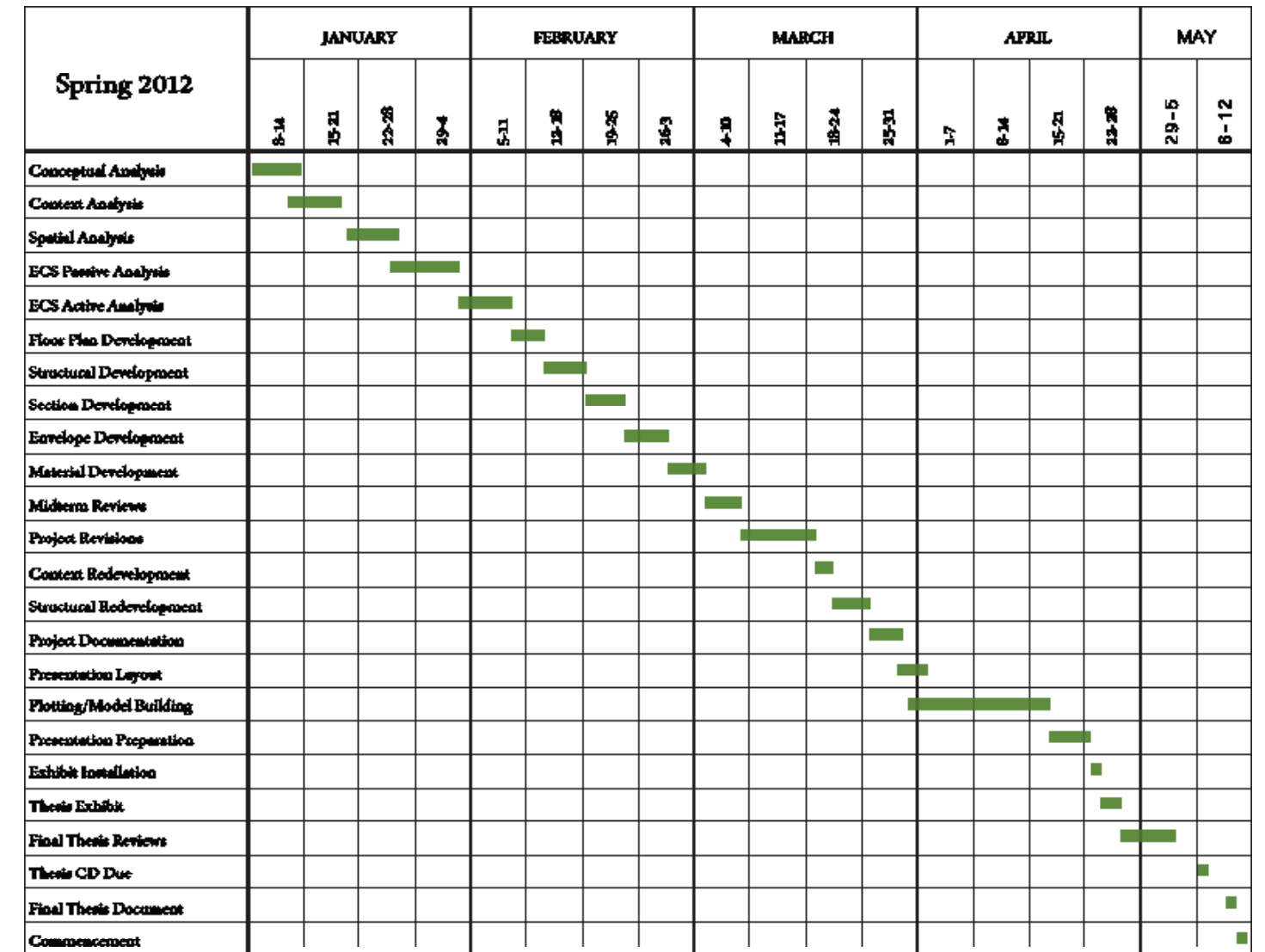
- MARVIN WINDOWS COMPETITION- FARGO, ND
- OIL FIELDS MASTER PLANNING- WESTERN NORTH DAKOTA

FIFTH YEAR

FALL 2011 – STEPHEN WISCHER

- ARTIFACT

PROJECT SCHEDULE



THEORETICAL PREMISE OR UNIFYING IDEA RE- SEARCH

SUSAN MAXMAN HAS SUGGESTED THAT, “SUSTAINABLE ARCHITECTURE ISN’T A PRESCRIPTION. IT IS AN APPROACH, AN ATTITUDE. IT SHOULDN’T REALLY EVEN HAVE A LABEL. IT SHOULD JUST BE ARCHITECTURE” (MAXMAN, 1993).

IN MANY WAYS, GREEN DESIGN HAS ALWAYS BEEN SEEN AS AN ADDITION TO ARCHITECTURE, BUT IN REALITY, FOR ARCHITECTURE TO SURVIVE IN THE LONG RUN, IT HAS TO BE SUSTAINABLE. IF ANYTHING, THE PRIMARY FUNCTION OF ARCHITECTURE IS TO PROVIDE SHELTER. SHELTER BEING A MEANS OF PROTECTION AGAINST THE HEAT, RAIN, WIND AND COLD. ALTHOUGH ARCHITECTURE IS FULFILLING THE DEFINITION OF SHELTER, IT IS ALSO MAKING THE ENVIRONMENT MORE ADVERSE CLIMATICALLY.

SUSTAINABILITY HAS NOT ALWAYS BEEN AN ISSUE FOR ARCHITECTS. IT WAS ALWAYS BEEN INTEGRATED WITH THE BUILDING DESIGNS SINCE THERE WAS NO TECHNOLOGY TO COVER THE POOR DESIGN. TODAY, A BUILDING CAN BE MADE WITHOUT ANY OPENINGS AND STILL BE ABLE TO FUNCTION WITH THE HELP OF ARTIFICIAL LIGHTING. FURTHERMORE, BUILDINGS THAT RESPOND TO HOT CLIMATES ARE NO DIFFERENT FROM THOSE BEING BUILT IN COLD CLIMATES. ARCHITECTURE HAS LOST ITS BALANCE WITH ITS ENVIRONMENT AND IS NOW CONTRIBUTING TO PROBLEMS SUCH AS GLOBAL WARMING. ACCORDING TO USGBC, HALF OF THE GREENHOUSE GAS EMISSION IN THE U.S. ARE PRODUCED BY BUILDINGS. THEREFORE, TO OFFSET THIS, USGBC CAME UP WITH THE ULTIMATE GOAL OF THE MEMORANDA: CARBON-NEUTRAL BUILDINGS BY 2030 (HOLOWKA, 2007). THIS PRIMARILY FOCUSES ON DESIGNING AND DEVELOPING BUILDINGS THAT ARE ENERGY EFFICIENT AND HAVE NO IMPACT ON THE ENVIRONMENT. A BETTER UNDERSTANDING OF SUSTAINABLE DESIGN WOULD HELP TO REDUCE THE NEGATIVE EFFECT ON THE ENVIRONMENT.

SUSTAINABLE DESIGN INCLUDES THE RELATION OF PERFORMANCE, CULTURE, ECONOMICS, AND AESTHETICS. MOST OF THE GREEN BUILDINGS BUILT TODAY ARE HIGHLY DOMINATED BY BUILDING PERFORMANCE. GREEN BUILDINGS LACK THE BALANCE BETWEEN PERFORMANCE, CULTURE, ECONOMICS, AND AESTHETICS. THE PROBLEM IS THAT SUSTAINABILITY IS SEEN AS A QUANTITATIVE APPROACH, AN AFTERTHOUGHT, SOMETHING SLAPPED ON LATER. BECAUSE OF THIS, EVEN THE MOST ENERGY EFFICIENT BUILDINGS ARE NOT ARCHITECTURALLY PLEASING.

MANY PEOPLE, INCLUDING ME, BELIEVE THAT GREEN DESIGN TENDS TO BE UGLY. IT IS THE LINE THAT WE DRAW BETWEEN ESSENTIAL AND OVERDONE THAT MAKES A BUILDING BEAUTIFUL OR UGLY. GOOD ARCHITECTURE IS GREEN ARCHITECTURE, BUT GREEN ARCHITECTURE ISN’T NECESSARILY GOOD ARCHITECTURE. ACCORDING TO KEN YEANG, “A GOOD BUILDING SHOULD BE SUSTAINABLE ALREADY; ENVIRONMENTAL CONCERNS SHOULD BE BAKED IN. THE REASON WHY SOLAR ARCHITECTURE IN THE 1970’S FAILED WAS BECAUSE THEY LOOKED LIKE BUILT PLUMBING AND ARE UGLY. IF WE WANT ECO-STRUCTURES TO BE ACCEPTABLE TO THE PUBLIC THEY HAVE TO BE AESTHETICALLY BEAUTIFUL” (PASTERNAK, 2009).

ACCORDING TO STEPHEN ZACKS, "IT'S A VERY SIMPLE REFLEX. ONCE WE MARKET SUSTAINABILITY, WE CAN REALLY INTEGRATE IT, AND IT WILL CHANGE AND ENRICH THE FORMAL LANGUAGE OF ARCHITECTURE." HIS STATEMENT ABOUT MARKETING SUSTAINABLE ARCHITECTURE IS TRUE, AND WE SURLY NEED TO CHANGE OUR THOUGHT PROCESS TO "FORM FOLLOWS PERFORMANCE" (ZACKS, 2008).

BUILDING PERFORMANCE

BUILDING PERFORMANCE IS A PRAGMATIC APPROACH TO GENERATE DESIGN. ITS TRAITS CAN BE SEEN IN INDIGENOUS VERNACULAR STRUCTURES LIKE THE TEE-PEE AND IGLOO. THE BASIC IDEA IS TO DERIVE THE BUILDING ENVELOPE BASED ON THE CLIMATE OF THAT PARTICULAR LOCATION. THEREFORE, THE BUILDING FORM IN A HOTTER CLIMATE IS DIFFERENT THAN THAT OF A BUILDING FORM IN A COLDER CLIMATE. BUILDING PERFORMANCE IS BASICALLY THE AMALGAMATION OF CLIMATOLOGICAL, BIOLOGICAL, GEOLOGICAL, AND TOPOGRAPHICAL FEATURES. SUSTAINABILITY ACKNOWLEDGES THE UNDERSTANDING OF UNIQUE CHARACTERISTICS PARTICULAR TO THOSE PLACES AND HOW THE CHARACTERISTICS CAN BE CELEBRATED OR PROTECTED.

THE IDEA OF USING LOCAL MATERIAL IS A BIG PART OF SUSTAINABLE DESIGN, BUT DUE TO RESTRICTIVE FACTORS ASSOCIATED WITH IMPORTING MATERIALS FROM OTHER PLACES THE IDEA IS MINIMIZED. THAT IS NOT TO SAY, HOWEVER, THAT SOMEONE FROM NORTH DAKOTA CAN FIND THE SAME BUILDING ENVIRONMENT SIMILAR TO THAT OF FLORIDA. SUSTAINABLE DESIGN IS AN ART THAT HAS A SPECIFIC ANSWER TO SPECIFIC AND IS NOT A SCIENCE THAT APPLIES THE SAME GENERAL RULE TO ALL SITUATIONS. NOMADIC TRIBES (PLAINS INDIANS) DEVELOPED A DIFFERENT ARCHITECTURAL RESPONSE, A LIGHT-WEIGHT MOBILE STRUCTURE CALLED TEE-PEE. DURING WINTER, THE FIRE INSIDE WOULD KEEP THE STRUCTURE WARM, LETTING THE SMOKE OUT FROM THE SMALL OPENING ON THE TOP. IN SUMMER, FLAPS AT THE BOTTOM COULD BE OPENED TO ACCESS THE COOL BREEZE (MCLENNAN, 2004). HUMANITY'S ANCESTORS LOOKED AT NATURE FOR INSPIRATION; THEY UNDERSTOOD THE FACT THAT NATURE CAN PROVIDE SOLUTIONS TO PROBLEMS.

CULTURAL IMPACT

CULTURAL CONSCIOUSNESS IS AN IDEOLOGY TO DESIGN BUILDING WITH CULTURE IN MIND. IT IS MORE OF A TRADITIONAL APPROACH TO DESIGN. FOR EXAMPLE, WHENEVER CHURCHES ARE BUILT, THEY ARE BUILT WITH TRADITIONAL STYLES IN MIND. CULTURAL CONSCIOUSNESS DOESN'T REALLY MEAN IMITATING HISTORY; RATHER, IT'S AN APPROACH TO MAKE ARCHITECTURE THAT BLENDS INTO THE ORTHODOX ENVIRONMENT. SEEN THIS WAY, CULTURE COULD BE ARGUED TO BE A SOCIAL CONSTRUCT, AN IDEOLOGY CREATED BY A PARTICULAR GROUP IN A SOCIETY. IT IS NOT SOMETHING THAT AUTOMATICALLY EXISTS BUT IS MERELY A CONSTITUENT OF A CULTURE. EVEN IF CULTURE IS A SOCIAL CONSTRUCT, THERE SHOULD BE NO HARM IN ACKNOWLEDGING AND RESPECTING IT. AS WITH NATURE, SOCIAL CONSTRUCTIVISM IS ALSO AN INITIATOR FOR POST-MODERN MOVEMENTS. THIS IS NOT TO SAY WE ARE TRYING TO LIMIT EXPERIMENTATION OR INNOVATION, BUT RATHER THAT WE ARE EVOLVING IN WAYS THAT ARE RESPECTFUL TO CULTURE. HOWEVER, PEOPLE WHO BELIEVE IN THE IDEA OF SOCIAL CONSTRUCTIVISM TEND TO DISREGARD EVERYTHING THAT EXISTS. CULTURAL CONSCIOUSNESS IS AN AVANT-GRADE APPROACH TO DESIGN THAT PUSHES BOUNDARIES BUT STILL TIES IT INTO THE CULTURAL REALM. "IF WE BUILD IN A DESERT, LET THE HOUSE KNOW THE DESERT AND THE DESERT BE PROUD OF THE HOUSE BY MAKING THE HOUSE AN EXTENSION OF THE DESERT, SO THAT WHEN YOU ARE IN THE HOUSE THE DESERT SEEMS THE HOUSE'S OWN EXTENSION... THE SAME THOUGHT, IN THE SAME FEELING, GOES OF WHATEVER WE BUILD WHEREVER WE BUILD IT" (MCLENNAN, 2004).

SUSTAINABLE AESTHETIC

AESTHETIC VALUE IS BASED ON WHAT WE SEE, HOW WE EXPERIENCE SPACE, AND WHAT COULD BE PERCEIVED ABOUT THE SPACE. THE IDEA IS TO GIVE THE EXPERIENCE OF SPACE TO THE ESSENCE OF ITS EXISTENCE. THE PROBLEM, HOWEVER, IS THAT BECAUSE THERE IS A DISPARITY BETWEEN THE OBJECTIVE AND SPIRITUAL VALUE, THERE IS DOUBLY THE VALIDITY OF ITS ABILITY TO EXPLAIN THE WORLD. ARCHITECTURE WITHOUT ITS EXPERIENTIAL ESSENCE IS LIKE A WORD WITHOUT MEANING, WHICH EVENTUALLY IS NONSENSICAL. A DESIGNER GETS SO CARRIED AWAY FROM THE LITERAL TRANSLATION OF SUSTAINABLE DESIGN THAT HE FORGETS THE 'SPIRITUAL' ASPECT OF THE BEING. HENCE, A SUSTAINABLE PRINCIPLE CAN BE USED TO GENERATE A PERFECT BUILDING BUT IT IS STILL NOT COMPLETE IF THE IMPLICATION OF EFFICIENCY IS NOT CONTRADICTED. "IF SUSTAINABLE DESIGN COULD BE BUILT IN ANY STYLE AND APPEAL TO ANY PERSON REGARDLESS OF AESTHETIC PREFERENCES, THEN WHAT IS THERE A NEED TO DISCUSS AESTHETICS AND BEAUTY WITH THE PHILOSOPHY?" (MCLENNAN, 2004). ANY BUILDING THAT IS SUSTAINABLE MUST BE BEAUTIFUL OR HAVE SOME AESTHETIC VALUE OR ELSE IT IS NOT GOING TO SURVIVE IN THE LONG RUN. PEOPLE TEND TO PRESERVE BUILDINGS THAT LOOK GOOD AND ADD BEAUTY TO THEIR COMMUNITY, BUT BEAUTY IS AN INTRINSIC VALUE OF ARCHITECTURE; IT'S MORE OF A FUNCTION THAN APPEARANCE.

SUSTAINABLE ECONOMICS

IN PRACTICE, ANY EFFECTIVE GREEN BUILDING HAS COSTS ASSOCIATED WITH ITS CONSTRUCTION AND MAINTENANCE. GREEN ECONOMICS HAS ALWAYS BEEN A CONTROVERSIAL TOPIC IN TERMS OF GREEN BUILDINGS VS. GENERIC BUILDINGS. A LOT OF CLIENTS SHY AWAY FROM GREENER BUILDING BECAUSE OF THEIR PRECONCEPTION THAT GREEN BUILDINGS ARE EXPENSIVE TO BUILD, WHICH IS NOT ALWAYS TRUE. MOST GREEN BUILDINGS SEEK ADDITIONAL COSTS BECAUSE OF THE LIMITED PRODUCTION OF A PARTICULAR MATERIAL AND LACK OF COMPETITION IN THAT MARKET. ALSO, SINCE THE IDEA REQUIRES A LOT OF RESEARCH BEFOREHAND, IT FURTHER ADDS COST AS DESIGNERS STILL TRY TO LEARN AND INNOVATE ON SUSTAINABLE DESIGNED STRATEGIES. THE ABILITY TO DESIGN HEALTHIER BUILDINGS THAT IMPROVE PEOPLE'S MINDSET BY LIVING IN THE BUILDING ADDS TO THEIR PRODUCTIVITY, WHICH IS ALSO ACCOUNTED FOR IN GREEN ECONOMICS. ACCORDING TO RESEARCH BY THE ROCKY MOUNTAIN INSTITUTE, "GREEN BUILDINGS TYPICALLY SELL OR LEASE FASTER, AND RETAIN TENANTS BETTER, BECAUSE THEY COMBINE SUPERIOR AMENITY AND COMFORT WITH LOWER OPERATION COSTS AND MORE COMPETITIVE TERMS. THE RESULTING GAINS IN OCCUPANCIES, RENT, AND RESIDUALS ALL ENHANCE FINANCIAL RETURN" (KAROLIDES, 2002). THE INSTITUTE ALSO REPORTED "BETTER INDOOR AIR QUALITY CAN IMPROVE HEALTH AND PRODUCTIVITY AND REDUCE LIABILITY RISKS. THE EPA ESTIMATED THAT BUILDING RELATED U.S. ILLNESSES ACCOUNTS FOR \$60 BILLION OF ANNUAL PRODUCTIVITY LOST NATIONWIDE, AND A WIDER STUDY VALUED THAT LOSS AS HIGH AS OVER \$400BILLION" (KAROLIDES, 2002). OFTEN, THESE ARGUMENTS ARE OVERLOOKED BECAUSE OF LACK A OF DIRECT CONNECTION AND PEOPLE DEMANDING THINGS RIGHT NOW. JASON MCLENNAN OUTLINES FOUR FACTORS THAT HOST SUSTAINABLE ECONOMICS: A DESIGN TEAM, A SITE AND A PROJECT TYPE, ECONOMIC CRITERIA THE COST IS BEING COMPARED AGAINST, AND HOW GREEN THE PROJECT IS (MCLENNAN, 2004).

SUMMARY OF THE RESULTS FROM THE THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

ECO-FRIENDLY HAS BEEN THE BONAFIDE THEME OF TODAY'S GLOBALIZED WORLD. EVERYTHING IS GOING GREEN, BUT IN THE LONG RUN, IT HAS TO BE SUSTAINABLE. SUSTAINABLE ARCHITECTURE CAN BE SAID TO BE AN ATTITUDE. THE MAIN PURPOSE OF ARCHITECTURE IS TO PROVIDE SHELTER, AGAINST ALL CLIMATIC CHANGES TO BE BARED BY HUMANS. SUSTAINABLY HAS ALWAYS BEEN MERGED WITH BUILDING DESIGNS IN ARCHITECTURE AND HAS NOT BEEN A SEPARATE ISSUE. TODAY, BUILDINGS ARE BUILT WITH ARTIFICIAL SYSTEMS LIKE ARTIFICIAL LIGHTING OR ARTIFICIAL HEATING. THESE INNOVATIONS LEAD TO OTHER ISSUES SUCH AS GLOBAL WARMING AS ARCHITECTURE LOOSES ITS BALANCE WITH THE ENVIRONMENT. IN THIS CONTEXT, USGBC CAME UP WITH EXCELLENT IDEAS OF CARBON-NEUTRAL BUILDINGS IN THE NEAR FUTURE, WHICH FOCUS ON DESIGNING AND DEVELOPING BUILDINGS THAT ARE ENERGY-EFFICIENT AND ENVIRONMENTALLY FRIENDLY. FOR THIS, ONE NEEDS TO KNOW SUSTAINABLE DESIGNS BETTER.

SUSTAINABLE DESIGN INCLUDES FOUR FACTORS: PERFORMANCE, CULTURE, ECONOMICS, AND AESTHETICS BUT GREEN BUILDINGS LACK THE BALANCE BETWEEN THESE FACTORS. MOST ENERGY-EFFICIENT BUILDINGS ARE NOT ARCHITECTURALLY PLEASANT. PEOPLE BELIEVE THAT GREEN DESIGNS ARE NOT SATISFYING AND IT IS ALSO TRUE THAT GREEN ARCHITECTURE IS NOT ALWAYS GOOD ARCHITECTURE. A GOOD BUILDING SHOULD BE SUSTAINABLE AND ECO-FRIENDLY. BUILDING PERFORMANCE, A REALISTIC APPROACH BASED ON THE CLIMATE OF A PARTICULAR LOCATION, IS CONCERNED WITH A COMBINATION OF WEATHER, BIOLOGICAL, GEOLOGICAL, AND TOPOGRAPHICAL FEATURES. AN EXAMPLE OF THIS CAN BE A STRUCTURE LIKE THE TEE-PEE OR IGLOO. SUSTAINABILITY RECOGNIZES UNDERSTANDING THE DISTINCTIVE CHARACTERS OF PLACES AND HOW IT CAN BE PROTECTED (MCLENNAN, 2004). THEREFORE, SUSTAINABLE DESIGN IS AN ART AND NOT A SCIENCE.

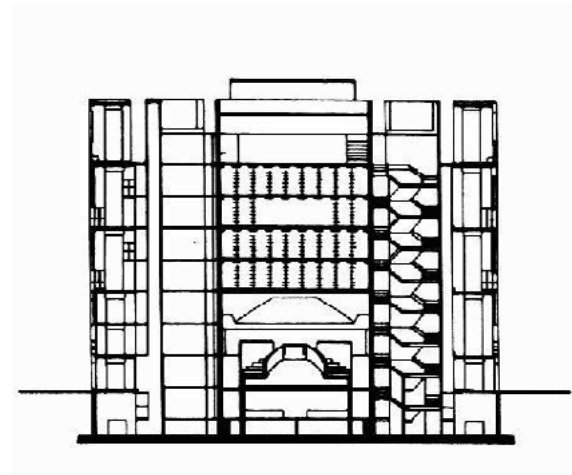
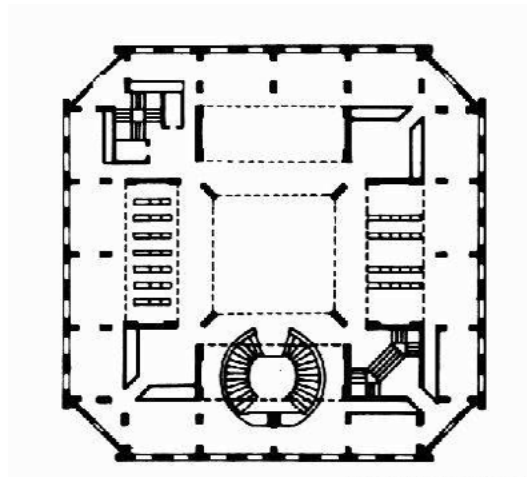
CULTURAL CONSCIOUSNESS IS A PRINCIPLE OF DESIGNING BUILDINGS WITH CULTURE IN MIND. CULTURE CAN BE TAKEN THE AS BELIEFS OF A GROUP IN SOCIETY, WHICH DON'T COME INTO EXISTENCE AT ONCE. SOCIAL CONSTRUCTIVISM IS THE PRODUCT OF THE POST-MODERN MOVEMENT. BUILDING DESIGN SHOULD BE SUCH THAT IT REFLECTS CULTURE AS WELL. AESTHETIC VALUE IS BASED ON THINGS RELATED TO WHAT WE SEE, HOW WE EXPERIENCE SPACE, AND WHAT COULD BE PERCEIVED ABOUT THE SPACE. ANY BUILDING THAT IS SUSTAINABLE MUST BE BEAUTIFUL OR HAVE SOME AESTHETIC VALUE OR ELSE IT IS NOT GOING TO SURVIVE IN THE LONG RUN. ARCHITECTURE MUST HAVE ITS EXPERIENTIAL ESSENCE. SUSTAINABLE ECONOMICS IS RELATED TO THE COST. WE KNOW THAT GREEN BUILDINGS HAVE COSTS ASSOCIATED WITH CONSTRUCTION AND MAINTENANCE; HOWEVER, IT IS A MISCONCEPTION THAT GREEN BUILDINGS ARE ALWAYS EXPENSIVE. GREEN ECONOMICS IS A HOT TOPIC IN TODAY'S WORLD. MATERIALS FOR GREEN BUILDINGS ARE LIMITEDLY PRODUCED AND THERE IS A LACK OF COMPETITION ALONG WITH LOTS OF RESEARCH WORK WHICH INCREASES THE COST. HOWEVER, GREEN BUILDINGS COMBINE SUPERIOR AMENITY AND COMFORT, WHICH CAN IMPROVE HEALTH AND PRODUCTIVITY.

CASE STUDIES



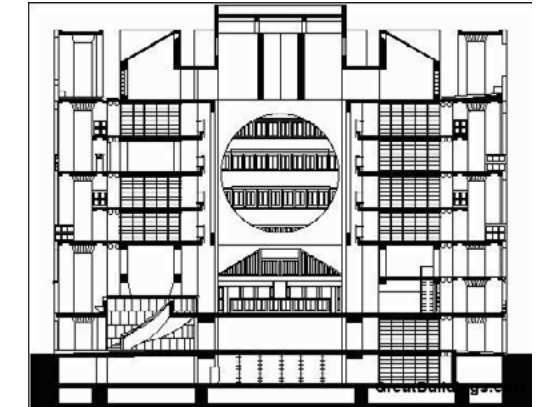
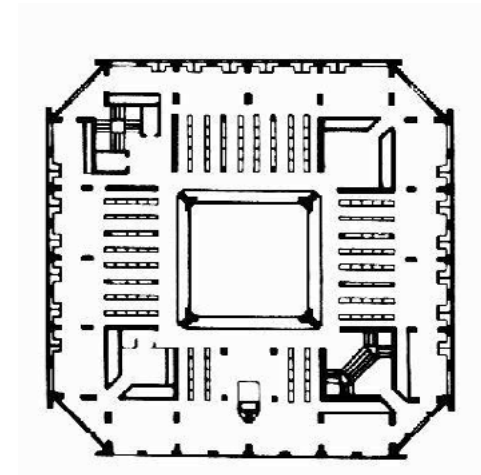
PHILLIPS EXETER LIBRARY
LOUIS KAHN
1965
12000 SQ.FT

THE PHILLIPS EXETER LIBRARY WAS DESIGNED BY THE ARCHITECT LOUIS KAHN IN THE YEAR 1965. THE CONSTRUCTION WAS COMPLETE IN 1971 WITH 250,000 SQUARE FEET FOR THE COLLECTION SPACE. THE ARCHITECT'S GOAL WAS TO DEVELOP A DESIGN BASED ON THE ESSENTIAL MEANING OF THE TYPOLOGY, A MORE PRAGMATIC APPROACH TOWARDS ARCHITECTURE. LOUIS KAHN IS AN ARCHITECT WHO LIKES TO PLAY WITH MATERIAL AND LIGHT. SIMILARLY, THE PHILIP EXETER LIBRARY PRESENTS THE STUDENTS WITH A SUBSTANTIAL ATRIUM THAT WASHES INTERIOR WALLS WITH LIGHT FROM THE CLERESTORY ABOVE. THE INTERIOR HIGHLIGHTS A LARGE AMOUNT OF EXPOSED CONCRETE THAT HAS BEEN USED WITH BRICK AND TEAK WOOD. COLLECTION SPACE IS LOCATED ON ALL FOUR SIDES,



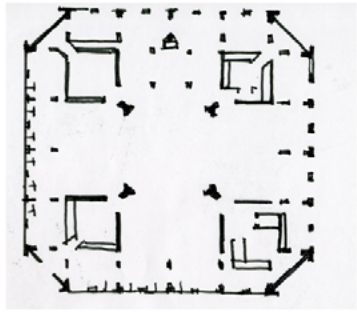
THE WALL DEFINING THE SPACE HAS A CIRCULAR OPENING TO ALLOW LIGHT TO FLOW IN THROUGH THE ATRIUM. SEATING IS LOCATED ALONG THE FACADE PROVIDING PLENTY OF DAYLIGHTING OPPORTUNITY TO THE READERS. THE LIBRARY IS VERY BIG IN TERMS OF ITS CAPABILITY TO ACCOMMODATE USERS. THERE ARE 210 CARRELS WITH LIMITED GROUP STUDY SPACES (PEREZ, 2010).

THE ARCHITECT DOES ACKNOWLEDGE NATURAL LIGHTING, AN ESSENTIAL PART OF THE LIBRARY ITSELF. THE LIBRARY BUILDING IS FAIRLY SYMMETRICAL AND THE EXTERIOR FACADE IS IDENTICAL ON ALL FOUR SIDES. THERE IS NO SENSE OF ENTRY BUT THE LANDSCAPING DOES GUIDE USERS TOWARD IT. THE BUILDING FACADE IS PRIMARILY CONSTRUCTED USING BRICK THAT BEARS THE EXTERIOR LOAD.

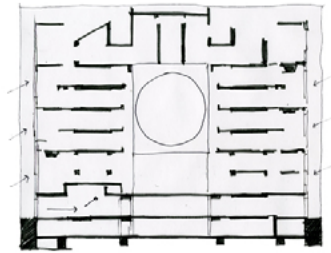


THE BUILDING IS WELL EQUIPPED WITH SUSTAINABLE STRATEGIES. PASSIVE SOLAR DESIGN WAS USED TO FILL THE BUILDING WITH NATURAL LIGHTING (DAMERON, 2011). THE ARCHITECT ALSO RECOGNIZES THE TRADITIONAL NEED OF THE PLACE BY INCORPORATING BRICK INTO THE DESIGN AND TYING IN WITH THE STATE OF NEW ENGLAND.

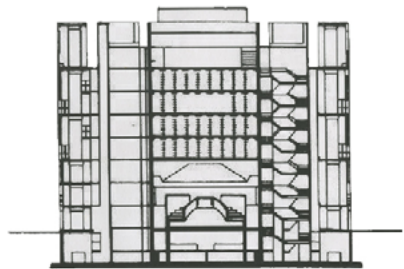
THE PHILLIPS EXETER LIBRARY IS A PREVIOUS-GENERATION DESIGN IN WHICH CHALLENGES OF THE DIGITAL WORLD DID NOT EXIST. THE CURRENT LIBRARY DOES PROVIDE ROOM FOR FUTURE EXPANSION BOOKS BUT IS UNABLE TO ADDRESS THAT USE IF THE BOOKS WENT DIGITAL. THIS CASE STUDY IS CERTAINLY NOT THE BEST TO ADDRESS CURRENT GENERATION LIBRARY ISSUES BUT IS ONE OF THE BEST TRADITIONAL LIBRARIES TO REFER TO FOR UNDERSTANDING THE ESSENCE OF THE LIBRARY.



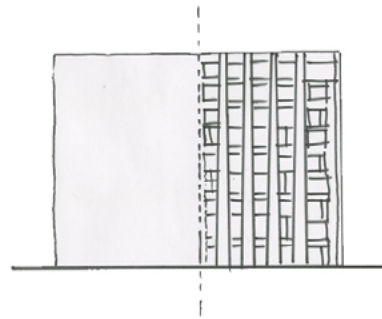
Structure



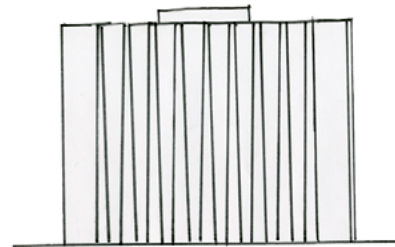
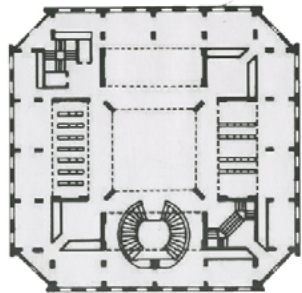
Natural Light



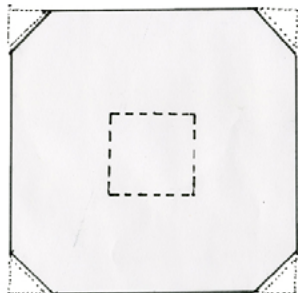
Plan To Section



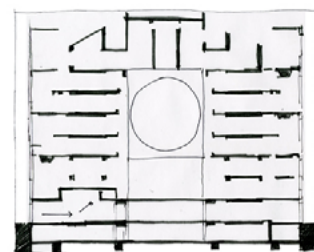
Geometry



Hierarchy



Massing



Circulation



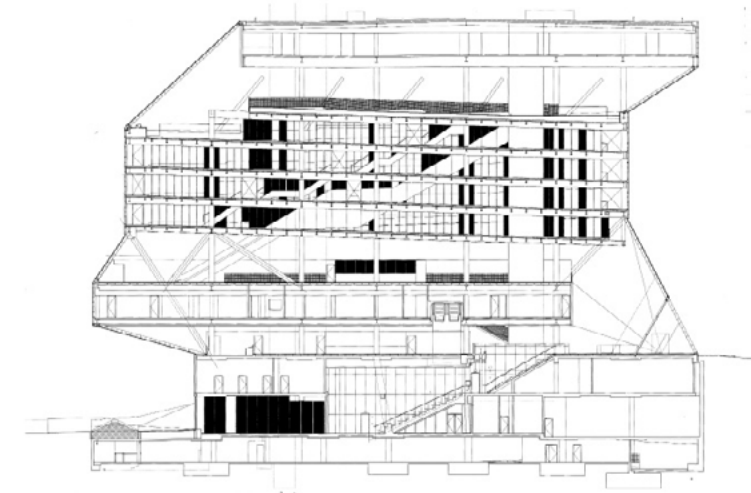
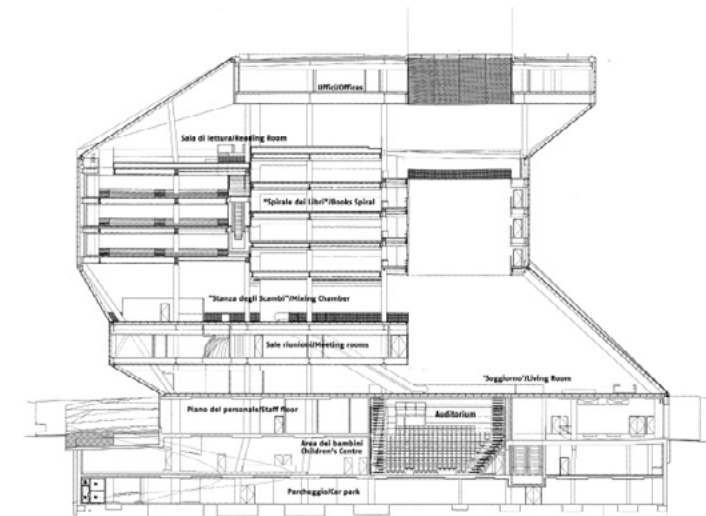
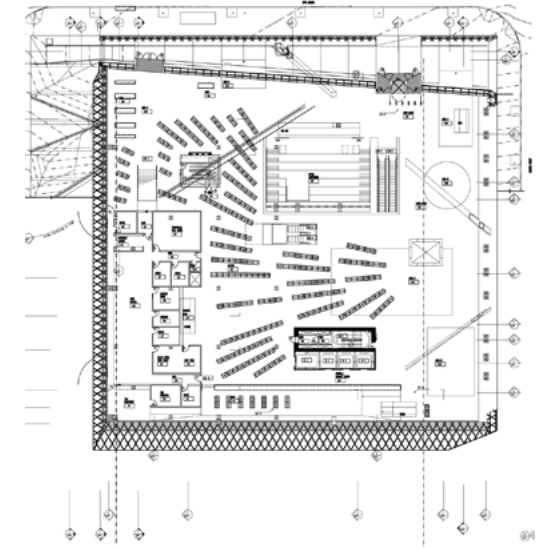
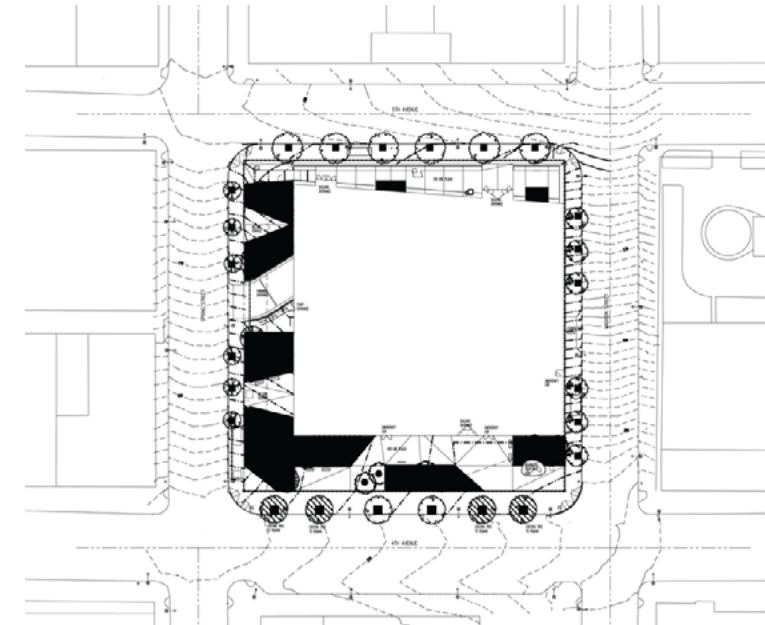
SEATTLE CENTRAL LIBRARY
 REM KOOLHAAS AT OMA AND LMN ARCHITECTS
 2004
 362000 SQ.FT.

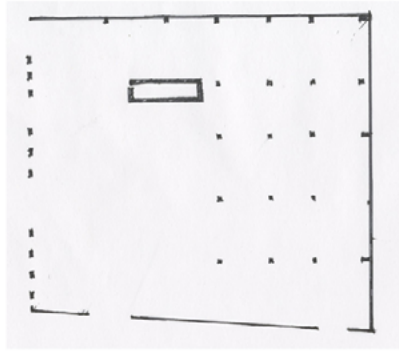
THE SEATTLE PUBLIC LIBRARY IS SITUATED AT 1000 FOURTH AVENUE, DOWNTOWN SEATTLE, WASHINGTON. THIS 362,987 SQUARE FOOT PUBLIC LIBRARY WAS DESIGNED BY THE ARCHITECT REM KOOLHAS FROM THE OFFICE OF METROPOLITAN ARCHITECTURE (OMA) IN COLLABORATION WITH LMN ARCHITECTS. THE PROJECT WAS COMPLETED IN 2004 WITH A TOTAL CONSTRUCTION COST OF \$165.5 MILLION, WHICH INCLUDES \$10 MILLION FOR A TEMPORARY LIBRARY TO BE USED WHILE THE NEW ONE WAS UNDER CONSTRUCTION (OUROUSOFF, 2005).

THE ARCHITECT WAS WELL AWARE OF THE CHANGING NEEDS OF A LIBRARY AND ITS TRANSFORMATION INTO A DIGITAL AGE. THE SEATTLE PUBLIC LIBRARY HAS A COLLECTION OF OVER A MILLION BOOKS'S EQUIPPED WITH 300 PUBLIC COMPUTERS, AND HAS WIRELESS NETWORK ACCESS THROUGHOUT THE BUILDING. THIS STACK-BASED LIBRARY DESIGN FEATURES A RAMP THAT RUNS THROUGH ALL FOUR FLOORS OF THE BUILDING CALLED "THE SPIRAL" (SUCH, 2005). THE RAMP ALSO MAKES THE COLLECTION SPACE HANDICAP-ACCESSIBLE AND LIMITS THE USE OF STAIRS AND ELEVATORS.

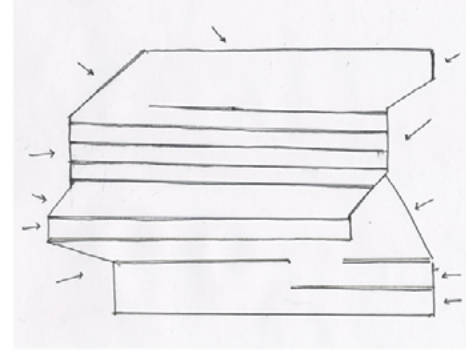
THE BUILDING HAS AN OPEN PLAN WITH AN AMPLE AMOUNT OF FLEXIBLE SPACES. THE LIBRARY ALSO INCLUDES SPACES LIKE A CLASSROOM, A PUBLIC MEETING ROOM, A WIRELESS ACCESS LOUNGE, AND A LARGE AUDITORIUM. LOOKING AT THE BUILDING FROM THE STREET, THE STRUCTURE PULLS DOWNWARD AND HAS NO GUIDANCE TOWARD THE ENTRY. THE FIRST FLOOR OF THE BUILDING PRESENTS THE USER WITH A LARGE ATRIUM SPACE, AUDITORIUM AND CHILDREN'S READING ROOM. THE MAJOR STACK COLLECTION IS LOCATED ON THE OTHER FLOORS AND THE ADMINISTRATIVE OFFICES AND MEETING ROOM ARE ON THE TOP FLOOR.

MATERIALS USED IN THE BUILDINGS ARE CONCRETE, GLASS, AND STEEL. CONCRETE FLOOR PLATES TRANSFER LOAD TO LARGE COLUMNS AND BEARING WALLS. THE EXTERIOR FACADE IS GLASS AND STEEL FOR LATERAL-WIND BRACING THAT TIES WELL WITHIN THE DOWNTOWN FEEL, ALTHOUGH THE FORM STILL SEEMS ALIENATED. THE BUILDING EXTERIOR FEATURES A TRIPLE-GLAZED CURTAIN WALL THAT REDUCES THE HEAT GAIN. SOME OF THE BUILDING'S SUSTAINABLE STRATEGIES ARE ITS USE OF A SUSTAINABLE SITE, ITS USE OF AN EXISTING SITE, AND ITS EASY ACCESSIBILITY THROUGH PUBLIC TRANSPORTATION. THE BUILDING ALSO INCORPORATES THE USE OF STORM WATER RUNOFF AND XERISCAPING. OF THE MATERIAL USED 20% IS THE BUILDING IS LOCALLY PRODUCED WITH ABOUT 75% OF THE CONSTRUCTION WASTE RECYCLED (SUCH, 2005). THE LIBRARY UTILIZES PLenty OF NATURAL LIGHTING AND ENERGY-EFFICIENT ARTIFICIAL LIGHTING. OVERALL, THE BUILDING MANAGED TO ACHIEVE A LEED SILVER RATING.

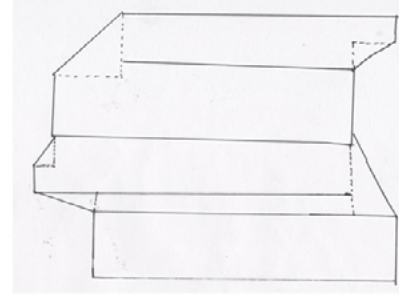
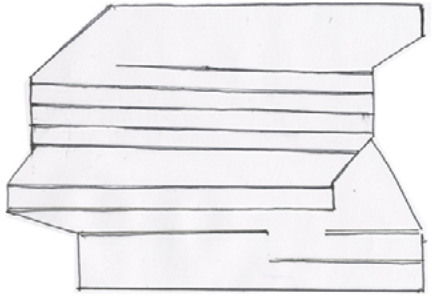




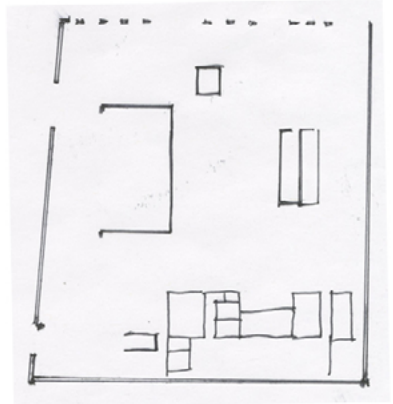
Structure



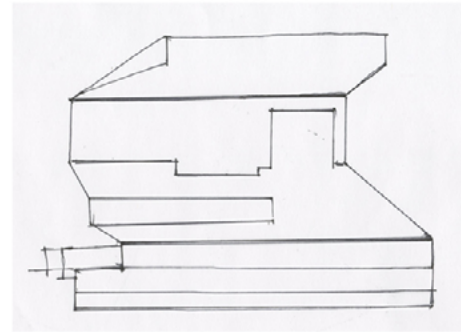
Natural Light



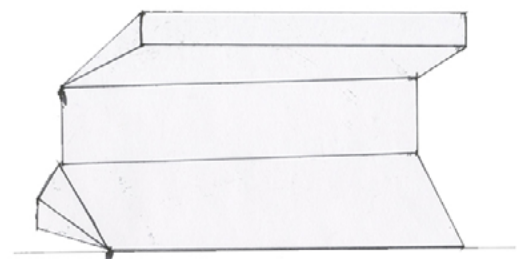
Geometry



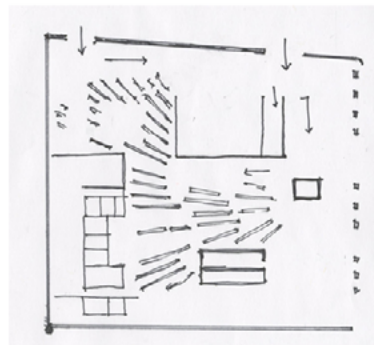
Plan To Section



Hierarchy



Massing



Circulation

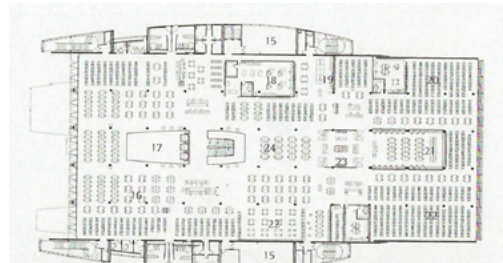
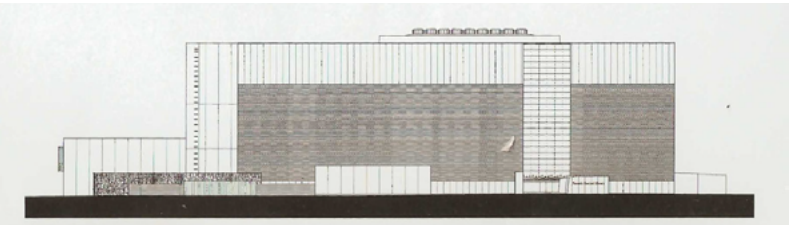
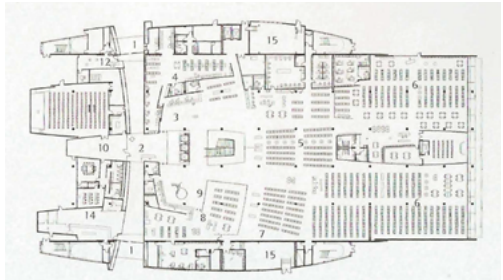
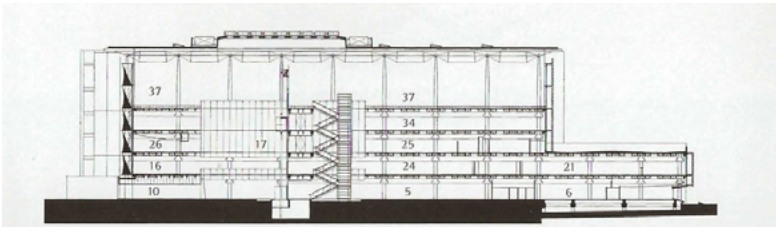
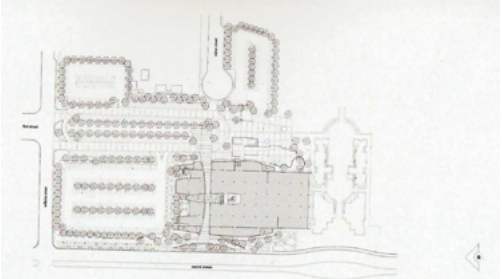
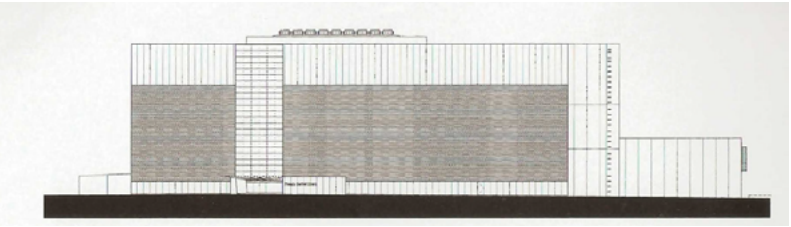


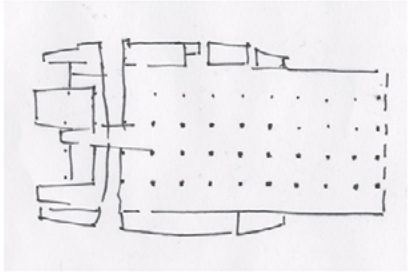
PHOENIX CENTRAL LIBRARY
BRUDERDWLARCHITECTS
1995
280000 Sq. Ft.

THE PHOENIX CENTRAL LIBRARY IS SITUATED IN PHOENIX, ARIZONA, AND WAS DESIGNED BY THE ARCHITECT WILLIAM BRUDER AND THE LOCAL ARCHITECTURE FIRM DWL ARCHITECTS. THE LIBRARY WAS OPENED TO THE GENERAL PUBLIC IN 1995. THIS 280,000 SQUARE FOOT FACILITY HOLDS MORE THAN A MILLION BOOKS AND 150 PUBLIC COMPUTER WORKSTATIONS. THE PHOENIX CENTRAL LIBRARY USES SOLAR PASSIVE DESIGN TO DEVELOP THE FORM FOR THE BUILDING. THE SOUTH AND NORTH FACADES ARE ALL GLASS WITH UNDULATING SHADING SCREENS; THE EAST AND WEST FACADES ARE MADE WITH METAL TO REFLECT SUNLIGHT. THESE PASSIVE DESIGN STRATEGIES ARE BASED ON THE ARIZONA CLIMATE, WHERE THE SUMMER IS CHALLENGING. EVEN WITH GLASS ON THE NORTH AND SOUTH FACADES, THE BUILDING'S WELL SHAD-ED TO RESIST HEAT GAIN BUT ALLOWS NATURAL LIGHTING. ALSO, THERE ARE ROUND SKYLIGHTS, THAT BRING LIGHT INTO THE TOP FLOOR OF THE FIVE STORIES BUILDING. THERE IS ONE DAY IN A YEAR WHERE THE SUN IS DIRECTLY ABOVE THE SKYLIGHTS, CREATING A DRAMATIC SCENE FOR THE VISITORS. INSIDE THE CENTRAL SPACE, A CANYON OF CRYSTAL LIGHTENS UP THE ATRIUM OF THE BUILDING. THERE IS A POND IN THE CENTER OF THE BUILDING THAT COOLS DOWN THE WARM AIR ENTERING THE BUILDING, AND THEN ANY WARM AIR FINDS ITS WAY OUT THOROUGH THE VENTS ON THE ROOF (BRANDON, 2008).

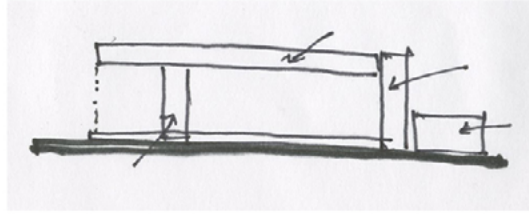
MATERIAL USE IN THE LIBRARY RANGE FROM GLASS TO ALUMINUM TO CONCRETE AND STEEL THAT STRUCTURALLY AND AESTHETICALLY SUPPORT THE BUILDING. THE STRUCTURAL COLUMNS ARE CUSTOM MADE AND ARE SUSPENDED THROUGH A TENSILE MEMBER. THE CLIENT ASKED THE ARCHITECT TO CREATE A WAREHOUSE OF BOOKS AND WAS EXPECTING A BOX WITH INTENSE STRUCTURAL CAPABILITY. THE ARCHITECT WAS SMART ENOUGH TO GIVE THE CLIENT A SQUARE BUILDING BUT WITH AN ENERGY EFFICIENT DESIGN. THE ARCHITECT IS INFLUENCED BY VERNACULAR ARCHITECTURE, THE CONCEPT OF HAVING THICK WALLS AND SMALL OPENINGS. THEREFORE, IN A DESERT CLIMATE, THE FEWER OPENINGS A BUILDING HAS THE MORE SOLAR GAIN CAN BE MINIMIZED (SPENCER, 2006). HOWEVER, IMPORTANT FACTOR AND THE WAY AN ARCHITECT ACKNOWLEDGES THAT IS BY PLACING SKYLIGHTS AND SHADED OPENINGS.

THE CONSTRUCTION COST PER SQUARE FOOT WAS ABOUT \$98 WITH THE TOTAL AMOUNT OF \$ 28,000,000. THE LIBRARY SERVES AS ONE OF THE GREEN BUILDINGS TO THE CITY. THE BUILDING ENVELOPE REDUCES THE ENERGY CONSUMPTION BY ALMOST A THIRD OF THE ESTIMATED COST. THIS BUILDING PROVIDES AN EXAMPLE TO PEOPLE WHO THINK SUSTAINABLE BUILDINGS ARE EXPENSIVE. NOT ONLY THE PHOENIX CENTRAL LIBRARY COST LESS THAN OTHER TRADITIONAL LIBRARIES IT WAS ALSO ABLE TO REDUCE THE BUILDING PERFORMANCE COST. IT ALSO IS A FINE EXAMPLE OF MODERN ARCHITECTURE WHERE A BUILDING IS SHAPED BY ITS CLIMATE.

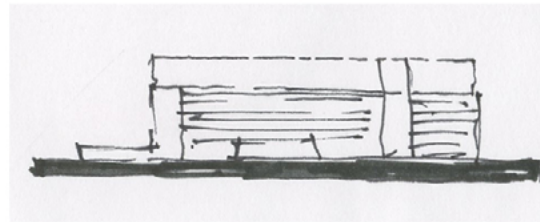
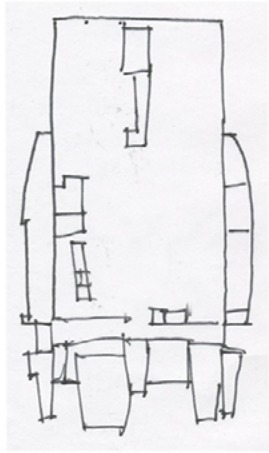




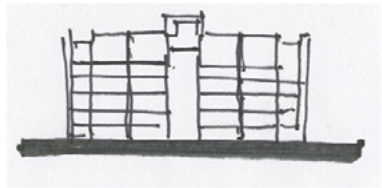
Structure



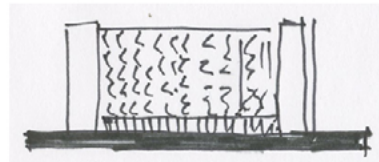
Natural Light



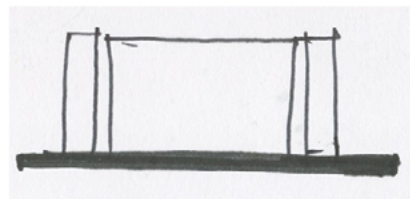
Geometry



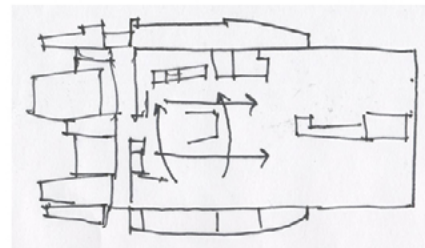
Plan To Section



Hierarchy



Massing



Circulation

“LIBRARIES STOOD FOR THE WORLD OF BOOKS AND WORDS,
THE WORLD OF HIGH CULTURE SO OFTEN BARRED TO THE
WORKING POOR IN THE SO-CALLED GILDED AGE OF MILLION-
AIRES.”
-ANDREW CARNEGIE

Summary

THE THREE CASE STUDIES THAT WERE CAREFULLY ANALYZED PRESENT DIFFERENT ELEMENTS TO BUILDING TYPOLOGY AS A WHOLE. THE PHILLIPS EXETER LIBRARY, PHOENIX CENTRAL LIBRARY AND SEATTLE PUBLIC LIBRARY ARE LIBRARIES FROM THREE DIFFERENT TIME PERIODS. THE PHILLIPS EXETER LIBRARY IS A STACK-BASED DESIGN WITH AN ATRIUM IN THE MIDDLE AND BOOKS AND STUDY SPACE ON BOTH SIDES. IT IS AMONGST LOUIS KHAN’S MOST SUCCESSFUL BUILDINGS WHERE HE EXPLORED THE LIBRARY AND ITS ESSENTIAL MEANING. SIMILARLY, THE PHOENIX CENTRAL LIBRARY HAD A LITTLE DIFFERENT APPROACH TOWARD ARCHITECTURE. THIS BUILDING HAD IT’S PRIMARY IDEAS BASED AROUND THE ENVIRONMENT AND USE BUILDING PERFORMANCE TO GENERATE ARCHITECTURE. BOTH OF THESE BUILDINGS USED SUSTAINABLE PRINCIPLES AND THE STACK-BASED LIBRARY TOWARD A DESIGN. HOWEVER, THE CASE STUDIES MENTIONED ABOVE DO NOT ACKNOWLEDGE THE DIGITAL AGE, WHICH CHALLENGES THE FUTURE OF LIBRARIES. ON THE OTHER HAND, THE MOST RECENT SEATTLE PUBLIC LIBRARY, FORESEES THE TYPOLOGY’S CHANGING NEEDS. THIS BUILDING HAS AN OPEN PLAN; THEREFORE, IT HAS THE ABILITY TO ADJUST WITH CHANGING TIME.

SUSTAINABILITY, WHICH IS THE PRIMARY FOCUS, IS VERY WELL ADDRESSED IN THE PHOENIX CENTRAL LIBRARY. THIS BUILDING PROVIDES AN EXAMPLE TO PEOPLE WHO THINK SUSTAINABLE BUILDING ARE EXPENSIVE. NOT ONLY DID THE PHOENIX CENTRAL LIBRARY COST LESS THAN OTHER TRADITIONAL LIBRARIES, IT WAS ALSO ABLE TO REDUCE THE BUILDING PERFORMANCE COST. IT ALSO IS A FINE EXAMPLE OF MODERN ARCHITECTURE WHERE BUILDING IS SHAPED BY ITS CLIMATE. ON THE OTHER HAND THE SEATTLE PUBLIC LIBRARY HAS A LEED SILVER RATING; ITS COST WAS EXPENSIVE IN COMPARISON TO THE OTHER TWO LIBRARIES. COST PER SQUARE FOOT FOR THE SEATTLE PUBLIC LIBRARY WAS ABOUT \$480 COMPARES TO \$98 PER SQUARE FOOT FOR THE PHOENIX PUBLIC LIBRARY. EVEN WITH THE TEN YEARS OF INFLATION, THE SEATTLE PUBLIC LIBRARY IS THREE TIMES MORE EXPENSIVE THAN THE PHOENIX PUBLIC LIBRARY.

IN RELATIONS TO THE THEORETICAL PREMISE AND UNIFYING IDEA, THE CASE STUDIES FORMULATE UNIQUE CHARACTERISTICS WITHIN THEMSELVES THAT COULD BE USED TO CREATE A BEAUTIFUL DESIGN. IN PARTICULAR IS THE PHOENIX PUBLIC LIBRARY THAT ADDRESSES ALL SUSTAINABLE DESIGN ISSUES IN A COST EFFECTIVE. WAY THIS BUILDING PRESENTS A GREAT EXAMPLE THAT EVEN GREEN BUILDINGS CAN BE INEXPENSIVE. THE SEATTLE PUBLIC LIBRARY IS A VERY MODERN LIBRARY WITH A LOT OF VIBRANT COLORS THAT OFFER USERS A SOCIAL SPACE FOR GATHERING. THIS IS A THEME THAT EVERY LIBRARY HAS TO ACKNOWLEDGE IN ORDER TO SURVIVE THE COMING DIGITAL AGE.

SCANDINAVIANS DESCRIBE THE LIBRARY AS “THE LIVING ROOM IN THE CITY” (KEN WORPOLE, 1995). SIMILARLY, KEN WORPOLE SAYS, “IMAGINATIVELY DESIGNED AND RESPONSIVE PUBLIC LIBRARY SERVICES CAN PLAY A PIVOTAL ROLE IN PROMOTING GREATER SOCIAL COHESION AND A STRONGER SENSE OF CIVIC PRIDE AND LOCAL IDENTITY” (KEN WORPOLE, 1995).

THE HISTORICAL CONTEXT OF THE THESIS

“ONE REASON WE ARE IN SO MUCH TROUBLE IS THAT OUR MODERN CULTURE IS PARADOXICALLY BEHIND TIMES, STILL ASSESSING THE WORLD THE WAY IT DID IN THE NINETEENTH OR EVEN EIGHTEENTH CENTURIES: AS A PLACE OF INEXHAUSTIBLE RESOURCES, WHERE MAN IS AT THE PINNACLE OF CREATION, SEPARATE FROM AND MORE IMPORTANT THAN ANYTHING AROUND HIM” (SUZUKI, 2002)

HUMANITY ALL KNOWS THAT IT HAS EMERGED OUT OF A NATURAL PHENOMENON, BUT WE STILL HESITATE TO ACKNOWLEDGE THAT OUR ACTIONS HAVE AN IMPACT ON NATURE. THE ENVIRONMENT IS THE BASIC ISSUE AT THE MOMENT, AND SUSTAINABILITY IS THE KEY INGREDIENT RELATING TO ARCHITECTURE. WHATEVER WE DO, IT AFFECTS NATURE, MOTHER NATURE! THOSE ACTIONS WHICH AFFECT NATURE ULTIMATELY AFFECT HUMANS TOO. WHAT GOES AROUND COMES AROUND BECAUSE ALL WE NEED TO UNDERSTAND IS WE ARE RELATED TO THE ENVIRONMENT. THOSE ACTIONS, EVEN THE ONES THAT HUMINITY ASSUMES ARE OUT OF HARM’S WAY, TURN OUT TO BE DETRIMENTAL TO NATURE. IS IT SO HARD FOR US TO UNDERSTAND THAT WE ARE NOT SOMETHING DIFFERENT FROM NATURE, BUT THAT WE ARE NATURE?

SUSTAINABLE DESIGN IS THE MEANS TOWARDS A BETTER LIVING, A DESIGN THAT EVOLVES FROM NATURE AND BLENDS ITSELF BACK TO NATURE. THERE ARE A LOT OF PEOPLE WHO BELIEVE THAT THE CONCEPT OF SUSTAINABILITY WAS INTRODUCED IN THE 1970’S WITH PASSIVE SOLAR DESIGN PRIMARILY TO CONSERVE ENERGY, AND THAT THE IDEA WAS THEN BROUGHT BACK IN 2000 AS ENERGY PRICES STARTED INCREASING AND ENVIRONMENTAL PROBLEMS BECAME MORE EVIDENT (MCLENNAN, 2004). GREEN DESIGN IS NOT A NEW CONCEPT; IT HAS BEEN AROUND SINCE HUMAN EXISTENCE. SUSTAINABLE DESIGN MANIFESTS ITSELF IN INDIGENOUS VERNACULAR STRUCTURES LIKE THE TEE-PEE AND IGLOO. IN ANCIENT TIMES, HUMANS USED TO THINK IN TERMS OF NATURE AND EVERY ACTION WAS BASED ON NATURAL PHENOMENA. WE USED TO WORSHIP NATURE AND RESPECT THE ENVIRONMENT FOR ALL THE THINGS IT OFFERED. NOW, WITH THE ADVANCEMENT OF SCIENCE AND TECHNOLOGY AND THE ABILITY TO CONTROL THE ENVIRONMENT, SUSTAINABLY IS TAKEN OUT OF THE EQUATION. AUTHOR JASON F. MCLENNAN DISCUSSES FOUR DIFFERENT STAGES OF SUSTAINABLE EVOLUTION: BIOLOGICAL, INDIGENOUS, VERNACULAR, INDUSTRIAL, AND MODERN BEGINNINGS.

ADAPTION IS THE MAJOR ISSUE IN THE ENVIRONMENT IN THE BIOLOGICAL BEGINNING. HUMANS AND ANIMALS ALL TRY TO FIND A COMFORT ZONE, IN SEARCH OF WHICH SOME SURVIVE AND SOME LOSE. MACROMERES CAN BE THE BEST EXAMPLE AS THEY HAVE A RELATIONSHIP WITH A CERTAIN GROUP OF FUNGUS. THE TERMITES HELP CREATE THE APPROPRIATE ENVIRONMENT FOR THE GROWTH OF FUNGUS. IN RETURN, THE FUNGUS HELPS THE TERMITES BREAK DOWN FORAGED WOOD AND GRASS TO SUGAR. THIS RELATIONSHIP HELPS BOTH SURVIVE ON A MUTUAL BASIS.

INDIGENOUS VERNACULAR ARCHITECTURE COMES FROM ANCIENT TIMES. PEOPLE BACK IN THOSE DAYS LOOKED TO NATURE TO FULFILL ALL THEIR NEEDS AND BELIEVED THAT IF NATURE CONFRONTED THEM WITH PROBLEMS, IT WOULD PROVIDE THEM WITH AN ANSWER ALSO. INDUSTRIALIZATION IN THE 19TH CENTURY TOOK SUSTAINABILITY TO THE APEX. DEVELOPMENT OF SCIENCE AND TECHNOLOGY GAVE POWER TO CONTROL THE ENVIRONMENT; BUILDINGS WERE BUILT WITH ARTIFICIAL LIGHTING AND HEATING BUT THE REALIZATION LATER HIT OF THE ADVERSE EFFECTS ON NATURE. IN THIS STAGE OF MODERN BEGINNING, GREEN BUILDINGS ARE NOW BECOMING COMMON. THE UNITED STATE GREEN BUILDING COUNCIL WAS SET UP TO FIND SOLUTIONS TO INCREASING ENVIRONMENTAL PROBLEMS. USGBC CAME UP WITH THE CONCEPT OF LEED, LEADERSHIP IN ENERGY EFFICIENT DESIGN, AND A POINT BASED SYSTEM THAT INCORPORATES ALL SUSTAINABLE DESIGN STRATEGIES FOR HEALTHY LIVING (MCLENNAN, 2004).

BIOLOGICAL BEGINNING

FROM THE DAY OF CREATION, HUMANS AND ANIMALS ALIKE HAVE ALWAYS ATTEMPTED TO CREATE THE MOST COMFORTABLE HABITAT SUITABLE FOR THEIR SURVIVAL. DEPENDING ON CLIMATE AND GENETIC CONDITIONS, ANIMALS AND PEOPLE MOVED FROM PLACE TO PLACE IN SEARCH OF COMFORT. SOME SURVIVED, NUMEROUS LOST THE BATTLE, AND MANY DEVELOPED CHARACTERISTICS THAT WOULD HELP THEM EVOLVE AND ADAPT WITH THE ENVIRONMENT.

MACROTERMES THAT ORIGINATED IN SUB-SAHARAN AFRICA PROVIDE US WITH CLEAR EVIDENCE OF ADAPTION. MACROTERMES LIVE IN A SYMBIOTIC RELATIONSHIP WITH A CERTAIN GROUP OF FUNGUS THAT LIVE IN EXTREME CARBON DIOXIDE LEVELS. THE TERMITES HELP TO CREATE AN APPROPRIATE ENVIRONMENT FOR THE GROWTH OF FUNGUS AND THE FUNGUS HELP TERMITES BREAK DOWN FORAGED WOOD AND GRASS TO SUGAR. THIS SYMBIOTIC RELATIONSHIP HELPS BOTH PARTIES FUNCTION AND LIVE TOGETHER ON A MUTUAL BASIS. AS A RESULT, THE CARBON DIOXIDE BALANCING PROCESS LEADS TERMITES TO BUILD STRUCTURES THAT ARE SEVERAL METERS ABOVE AND BELOW GROUND LEVEL. THE STRUCTURES BELOW ARE USED AS SHELTER AND THE STRUCTURES ABOVE BECOME THE CHIMNEY. THE VENTILATION THROUGH THE CHIMNEY WORKS THROUGHT OUT THE YEAR IN VARIOUS CLIMATIC CONDITIONS, AND THE DIFFERENCES ARE REMODELED BY TERMITES BY PLUGGING HOLES. THE STRUCTURE IS DEVELOPED IN SUCH A WAY THAT IT CAN EASILY ADAPT TO ENVIRONMENTAL NEEDS. ON NORMAL DAYS, WARM AIR RISES UP THROUGH THE CHIMNEY IN DIFFERENT DIRECTIONS; KNOWN AS THE STACK EFFECT. ON A WINDY DAY, THE AIR ENTERS THE STRUCTURE FROM THE CHIMNEY, FORCING THE WIND INSIDE TO EXIST FROM THE LEEWARD SIDES. BASICALLY, THE MOUND ACTS LIKE A GIANT LUNG THAT CONTROLS THE ENVIRONMENT IN A WAY IN A WAY NECESSARY FOR THE TERMITES AND THE FUNGUS TO COEXIST. THE IDEA OF USING LOCAL MATERIALS, IS NOW BECOME ONE OF THE SUSTAINABLE STRATEGIES, WAS A SUMMED FACT OF ANCIENT DAYS (MCLENNAN, 2004).

THE INDIGENOUS VERNACULAR BEGINNING

MANY OF OUR DESIGN STRATEGIES TODAY COME FROM ANCIENT VERNACULAR ARCHITECTURE. EVEN THE 1970'S PASSIVE SOLAR DESIGNS CAN BE FOUND IN THE RUINS OF MESA VERDE IN NEW MEXICO. THE VILLAGE WAS BUILT UPON A GIANT CLIFF THAT PROVIDED SHADE IN THE SUMMER AND SUN IN THE WINTER. THE STRUCTURE USED ENORMOUS STONES AND SMALL WINDOWS FOR THERMAL INSULATION. THE STONEWORK CREATED A THERMAL SINK THAT KEPT HEAT IN THE WINTER AND COOLED THE BUILDING DURING THE SUMMER MONTHS. NOMADIC TRIBES (PLAINS INDIANS) DEVELOPED A DIFFERENT ARCHITECTURAL RESPONSE; A LIGHT-WEIGHT MOBILE STRUCTURE CALLED THE TEE-PEE. DURING THE WINTER, THE FIRE INSIDE WOULD KEEP THE STRUCTURE WARM, LETTING SMOKE OUT FROM THE SMALL OPENINGS ON THE TOP. IN THE SUMMER, FLAPS AT THE BOTTOM COULD BE OPENED TO ACCESS THE COOL BREEZE. HUMANITY'S ANCESTORS LOOKED AT NATURE FOR INSPIRATION; THEY UNDERSTOOD THE FACT THAT NATURE CAN PROVIDE SOLUTIONS TO OUR PROBLEMS (MCLENNAN, 2004).

THE INDUSTRIAL BEGINNING

THE NEXT GENERATION OF SUSTAINABILITY WAS NOT THOUGHT OF UNTIL THE CONCEPT WAS TOTALLY LOST. INDUSTRIALIZATION IN THE 19TH CENTURY TOOK COMFORT TO A WHOLE NEW EXTENT. STRUCTURES OF ANY KIND COULD BE BUILT ANYWHERE IN THE WORLD. HOUSES COULD NOW BE RUN ON ARTIFICIAL LIGHTING, AIR CONDITIONING, AND HEATING. ADVANCEMENT IN SCIENCE AND TECHNOLOGY GAVE POWER TO CONTROL THE ENVIRONMENT TO WHATEVER EXTENT PEOPLE WANTED. NOT UNTIL THE 1970'S DID PEOPLE BEGIN RE-THINKING THE IMPACT OF INDUSTRIALIZATION ON THE ENVIRONMENT (MCLENNAN, 2004). IN THE AUTOMOBILE INDUSTRY, THE FIRST ELECTRIC CAR WAS LAUNCHED TO OFFSET GROWING OIL PRICES. CONSUMERS BECAME MORE CONSCIOUS AND STARTED CONSERVING ENERGY. HOWEVER, ALL THESE IDEAS DISAPPEARED WHEN ENERGY BECAME CHEAP AFTER THE RECESSION. PEOPLE RETURNED TO THEIR NORMAL HABITS, CONSUMING WASTEFULLY, MORE THAN THEY NEEDED, AND MORE THAN THEY COULD AFFORD.

THE MODERN BEGINNING

"AMERICA USES ONE-THIRD OF THE WORLD'S PAPER, DESPITE REPRESENTING JUST 5% OF THE WORLD'S POPULATION. SIMILARLY WE USE 25% OF THE OIL, 23% OF THE COAL, 27% OF THE ALUMINUM, AND 19% OF THE COPPER. AN AVERAGE AMERICAN USES TWICE AS MUCH FOSSIL FUEL AS THE AVERAGE RESIDENT OF GREAT BRITAIN AND 2.5 TIMES AS MUCH AS THE AVERAGE JAPANESE. WE CONSUME OVER 3.25 POUNDS OF BONELESS MEAT, 1.5 TIMES AS MUCH AS THE AVERAGE BRITAIN OR ITALIAN AND MORE THAN 2.5 TIMES AS MUCH AS THE AVERAGE JAPANESE." WILL ROGERS SAYS "TOO MANY PEOPLE SPEND MONEY THEY HAVEN'T EARNED, TO BUY THINGS THEY DON'T WANT, TO IMPRESS PEOPLE THEY DON'T LIKE." (LEON, 1999)

IN 1993, THE UNITED STATE GREEN BUILDING COUNCIL (USGBC) WAS SET UP TO FIND A SOLUTION TO THE INCREASING ENVIRONMENTAL PROBLEMS ARISING. USGBC CAME UP WITH THE WITH CONCEPT OF LEED, LEADERSHIP IN ENERGY EFFICIENT DESIGN. A POINT BASED SYSTEM THAT INCORPORATES ALL SUSTAINABLE DESIGN STRATEGIES FOR HEALTHY LIVING. GREEN BUILDINGS ARE NOW BECOMING COMMON. ABOUT 45 OF THE BUILDINGS CONSTRUCTED IN THE UNITED STATES HAVE LEED CREDENTIALS. THE GREEN MOVEMENT HAS STARTED, THE ONLY QUESTIONS IS HOW LONG IT WILL LAST:(USGBC, 2009).

THESIS GOALS

PRAGMATIC, PROGRAMATIC NEED, AND SPATIAL QUALITIES ANALYSES ASSOCIATED WITH DESIGN WILL BE CONDUCTED TO GENERATE AN IDEAL TYPOLOGICAL NEED.

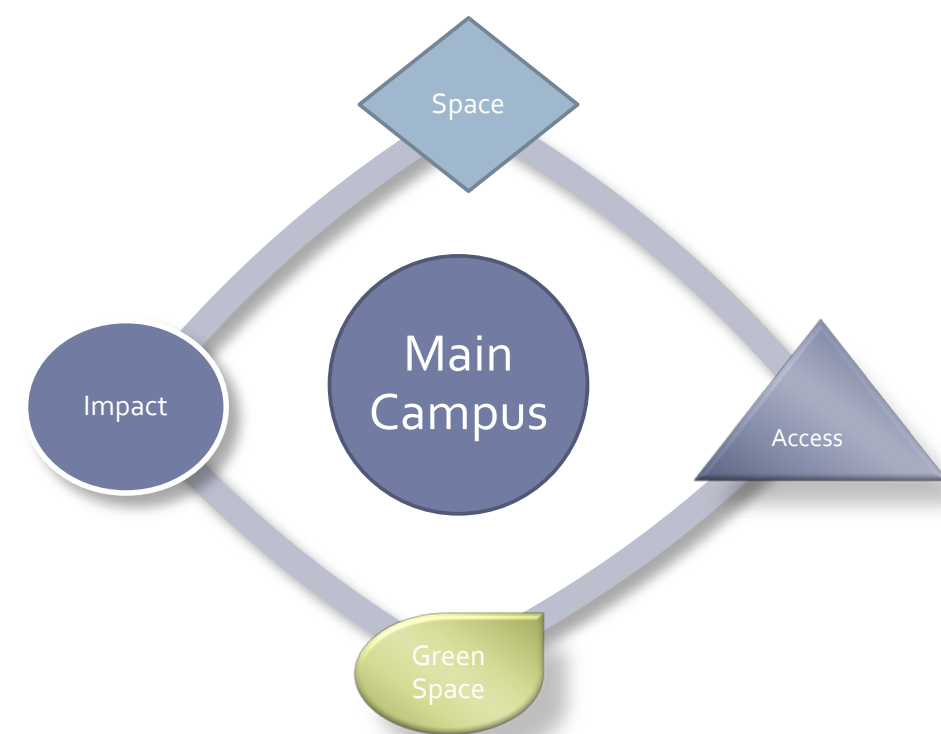
CAREFUL CHOICES WILL BE MADE TO OFFSET THE ARGUMENT PRESENTED IN THE THEORETICAL PREMISE/ UNIFYING IDEA RESEARCH.

MY GOAL IS TO CREATE A DESIGN THAT DEFINES SUSTAINABILITY AS A WHOLE.

I AIM TO CONDUCT RESEARCH UTILIZING A WIDE RANGE OF STUDY MATERIALS AND TAKING FULL ADVANTAGE OF THE RESOURCES MADE AVAILABLE TO STUDENTS.

I HOPE TO ATTEND MEETINGS HELD BY ORGANIZATIONS WITH RELATIONS TO THE LIBRARY COMMITTEE SYSTEM IN ORDER TO GAIN A BETTER UNDERSTANDING OF THE LIBRARY'S INNER WORKINGS AND NEEDS.

SITE PERFORMANCE ANALYSIS



POTENTIAL SITE



SITE ONE: VISITOR LOT



CENTRALIZED SITE

THE VISITOR LOT IS A CENTRALIZED LOCATION ON THE CAMPUS. THE CENTRALIZED POSITION OF THE LIBRARY WILL PROVIDE EASY ACCESS TO THE SURROUNDING DORMITORIES; SIEM, PAVIK, THOMPSON, SEVERNSON, REED, JOHNSON, WEIBLE, AND ON CAMPUS APARTMENTS. THIS LOCATION WILL FOCUS ON THE NORTH PORTION OF CAMPUS.

TRANSIT ROUTES

THIS SITE OPTION IS CIRCULATED BY MULTIPLE BUS ROUTES, ENABLING STUDENTS TO SUCCESSFULLY GET TO AND FROM THE LIBRARY.

COST

SITE OPTION ONE WILL HAVE A LARGE UPFRONT COST TO REMOVE THE ORIGINAL PARKING LOT TO BEGIN STRUCTURE FOOTINGS. A LARGE AMOUNT OF THE BUDGET WILL BE APPLIED TO THE REMOVAL OF THE PARKING LOT.

VIEWSHEDS ARE LOST

VIEWS OF THE NEW LIBRARY WILL BE LOST DUE TO THE CENTRALIZED LOCATION OF THE PROJECT. WITH NEWLY CONSTRUCTED FITNESS CENTER AND MEMORIAL UNION, NDSU IS MISSING THE THIRD PIECE TO THE PUZZLE; THE LIBRARY. WHY HIDE IT FROM THE DRIVER?

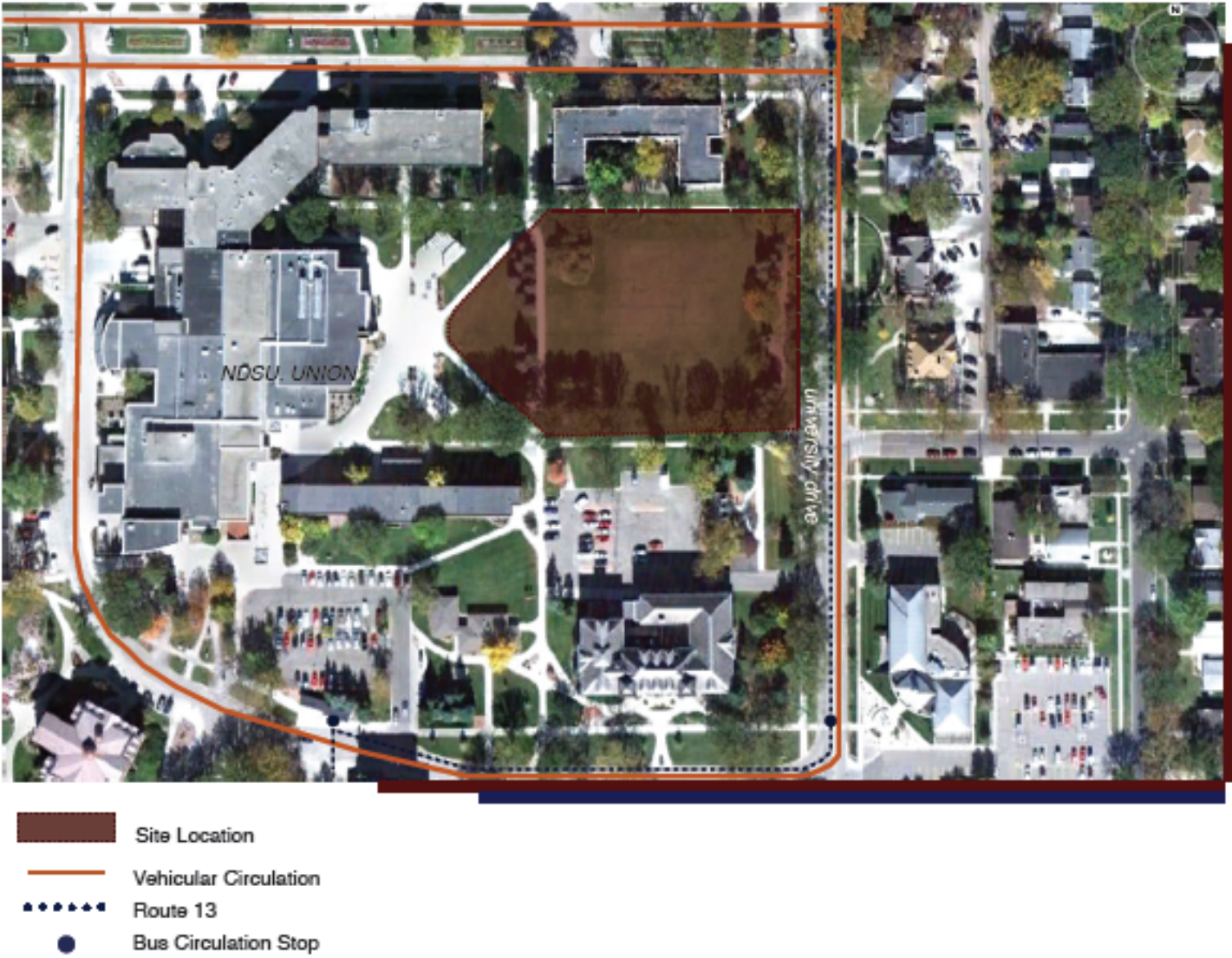
USER AND TRAVEL

SITE OPTION ONE FOCUSES ON CAMPUS RESIDENTS INSTEAD OF OFF CAMPUS RESIDENTS. THE FOCUS SHOULD BE THE OPPOSITE WHEN THE MAJORITY OF STUDENTS LIVE OFF CAMPUS AND WALK, BIKE OR DRIVE TO CAMPUS. WITH THE REMOVAL OF THE PARKING SURFACE, OFF CAMPUS USERS WILL HAVE TO TRAVEL EVEN FARTHER FOR THE NEW LIBRARY SITE COMPARED TO THE CURRENT LOCATION.

PARKING

THE VISITOR PARKING LOT THAT IS SHARED BY MANY OFF CAMPUS RESIDENTS WILL BE TRANSFORMED INTO THE NDSU LIBRARY. THE LARGE AMOUNT OF PARKING WILL BE RELOCATED FURTHER OFF CAMPUS, LIMITING THE OFF-CAMPUS STUDENT FOCUS.

SITE TWO: CHURCHILL FIELD



LOSS OF GREEN SPACE

AFTER A CIRCULATION ANALYSIS, THERE WERE NO ACTIVITIES THAT WENT ON AT CHURCHILL FIELD DURING VISITATIONS. THE LOSS OF THIS GREEN SPACE CAN BE REINTRODUCED USING GREEN SUSTAINABLE DESIGN.

PEDESTRIAN CIRCULATION

PEDESTRIAN CIRCULATION IS CENTRALIZED AROUND THE MEMORIAL UNION. BUSY PEDESTRIAN FLOW CONCENTRATION HAPPENS BETWEEN ALBRECHT BOULEVARD AND THE BABBLING BROOK LOCATED JUST WEST AND SOUTHWEST OF THE UNION.

TRANSIT AND ENTRANCE POINTS

MAJOR TRANSIT AND ENTRANCE POINTS ARE LOCATED ALONG UNIVERSITY AND 15TH AVENUE NORTH, CENTENNIAL BOULEVARD AND 12TH AVENUE NORTH.

COHESIVE UNIT

THE CHOSEN SITE LOCATION OF THE NDSU LIBRARY WILL CREATE A COHESIVE CONNECTION BETWEEN THE MEMORIAL UNION AND DORMITORIES; DINAN, CHURCHILL AND BURGUM.

MIXED USE BUSINESSES

POSSIBLE MIXED USED BUILDINGS CAN BE SECURED ACROSS FROM NEW THE LIBRARY SPACE. LOCAL BUSINESSES CAN HELP TERM UNIVERSITY DRIVE AS THE TRADITION COIN THE TERM TO ITS ORIGINAL MEANING AS A CENTRALIZED DRIVE CIRCULATED NEXT OR LEADING UP TO CAMPUS. THIS ARE COULD RESEMBLE THE INTERSECTION OF ALBRECHT AND 12TH AVENUE SOUTH.

PLAZA UTILIZATION

THE MEMORIAL UNION PLAZA WILL BE UTILIZED PROPERLY AS AN ENTRANCE AND GATHERING SPACE THAT WILL NOW SERVE TWO LANDMARK STRUCTURES ON CAMPUS, THE MEMORIAL UNION AND LIBRARY.

VIEWS AND INTEREST POINTS

NDSU WILL BENEFIT FROM IMPLEMENTATION OF THE LIBRARY NEXT TO UNIVERSITY DRIVE SO NEW RECRUITS AND VISITORS WILL BE ATTRACTED TO THE NEW STRUCTURE AND WILL MAKE NORTH DAKOTA STATE UNIVERSITY A MORE SUCCESSFUL CAMPUS.

SITE THREE: BENTSON BUNKER FIELDHOUSE



- Site Location
- Vehicular Circulation
- Route 13
- Route 31
- Route 32
- Bus Circulation Stop

PARKING

THE PARKING LOT SHARED BY EHLI HALL, CHURCHILL, CONSTRUCTION MANAGEMENT AND THE BENTSON BUNKER FIELDHOUSE WOULD BE TRANSFORMED INTO THE LIBRARY; IN TURN TAKING AWAY VITAL PARKING

CENTRALIZED SITE

BENTSON BUNKER FIELDHOUSE LOT IS A CENTRALIZED LOCATION ON THE CAMPUS. THE CENTRALIZED POSITION OF THE LIBRARY WILL PROVIDE EASY ACCESS TO THE SURROUNDING DORMITORIES; WEIBLE, STOCKBRIDGE, AND CAMPUS APARTMENTS. THIS LOCATION WILL FOCUS ON THE NORTH PORTION OF CAMPUS.

TRANSIT ROUTES

THIS SITE OPTION IS CIRCULATED BY MULTIPLE BUS ROUTES, ENABLING STUDENTS TO SUCCESSFULLY GET TO AND FROM THE LIBRARY.

MIXED USE BUSINESSES

POSSIBLE MIXED USED BUILDINGS CAN BE SECURED ACROSS FROM NEW THE LIBRARY SPACE. LOCAL BUSINESSES CAN HELP TERM UNIVERSITY DRIVE AS THE TRADITION COIN THE TERM TO ITS ORIGINAL MEANING AS A CENTRALIZED DRIVE CIRCULATED NEXT OR LEADING UP TO CAMPUS. THIS ARE COULD RESEMBLE THE INTERSECTION OF ALBRECHT AND 12TH AVENUE SOUTH.

VIEWS AND INTEREST POINTS

NDSU WILL BENEFIT FROM IMPLEMENTATION OF THE LIBRARY NEXT TO UNIVERSITY DRIVE SO NEW RECRUITS AND VISITORS WILL BE ATTRACTED TO THE NEW STRUCTURE. THIS LOCATION WILL SPARK MORE INTEREST BEING THAT IT WOULD BE SITUATED NEXT TO THE MAIN ATHLETIC COMPLEX ON CAMPUS.

COST

SITE OPTION THREE WILL HAVE A LARGE UPFRONT COST TO REMOVAL THE ORIGINAL PARKING LOT TO BEGIN STRUCTURE FOOTINGS. A LARGE AMOUNT OF THE BUDGET WILL BE APPLIED TO THE REMOVAL OF THE PARKING LOT.

USER AND TRAVEL

SITE OPTION THREE FOCUSES ON CAMPUS RESIDENTS INSTEAD OF OFF CAMPUS RESIDENTS. THE FOCUS SHOULD BE THE OPPOSITE WHEN THE MAJORITY OF STUDENTS LIVE OFF CAMPUS AND WALK, BIKE OR DRIVE TO CAMPUS. WITH THE REMOVAL OF THE PARKING SURFACE, OFF CAMPUS USERS WILL HAVE TO TRAVEL EVEN FARTHER FOR THE NEW LIBRARY SITE COMPARED TO THE CURRENT LOCATION.

SITE FOUR: WELLNESS CENTER



VIEWS AND INTEREST POINTS

NDSU WILL BENEFIT FROM THE IMPLEMENTATION OF THE LIBRARY NEXT TO 18TH AVENUE SO NEW RECRUITS AND VISITORS WILL BE ATTRACTED TO THE NEW STRUCTURE. THIS LOCATION WILL SPARK MORE INTEREST BEING THAT IT WOULD BE SITUATED NEXT TO THE WELLNESS CENTER COMPLEX ON CAMPUS.

TRANSIT AND ENTRANCE POINTS

MAJOR TRANSIT AND ENTRANCE POINTS ARE LOCATED ALONG 18TH STREET NORTH AND 12TH AVENUE SOUTH. THE LIBRARY WOULD BE CLEARLY SEEN FROM THE 12TH AVENUE BRIDGE TO THE SOUTHWEST.

USER AND TRAVEL

SITE OPTION FOUR FOCUSES ON OFF-CAMPUS RESIDENTS. THE FOCUS SHOULD BE THE OPPOSITE WHEN THE MAJORITY OF STUDENTS LIVE OFF CAMPUS AND WALK, BIKE OR DRIVE TO CAMPUS.

COHESIVE UNIT

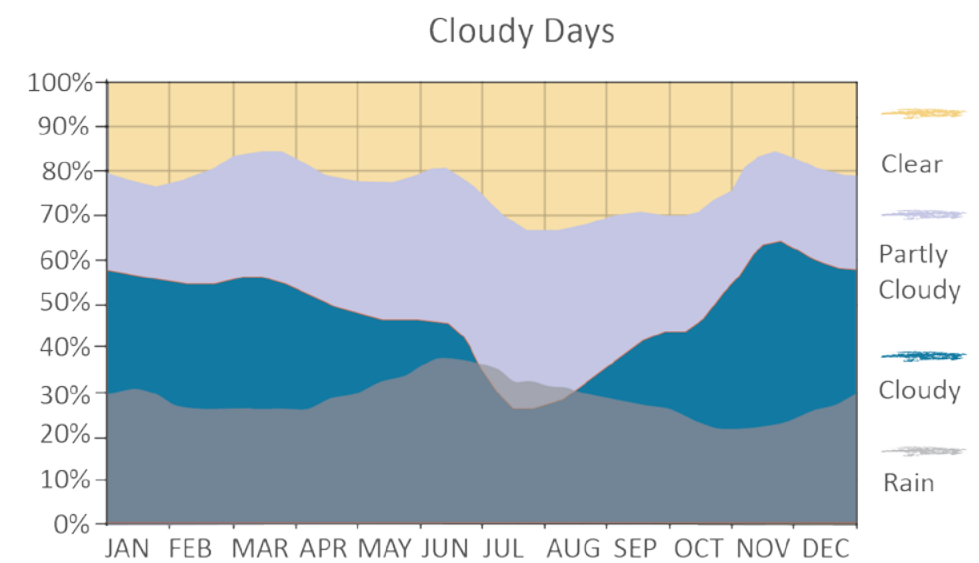
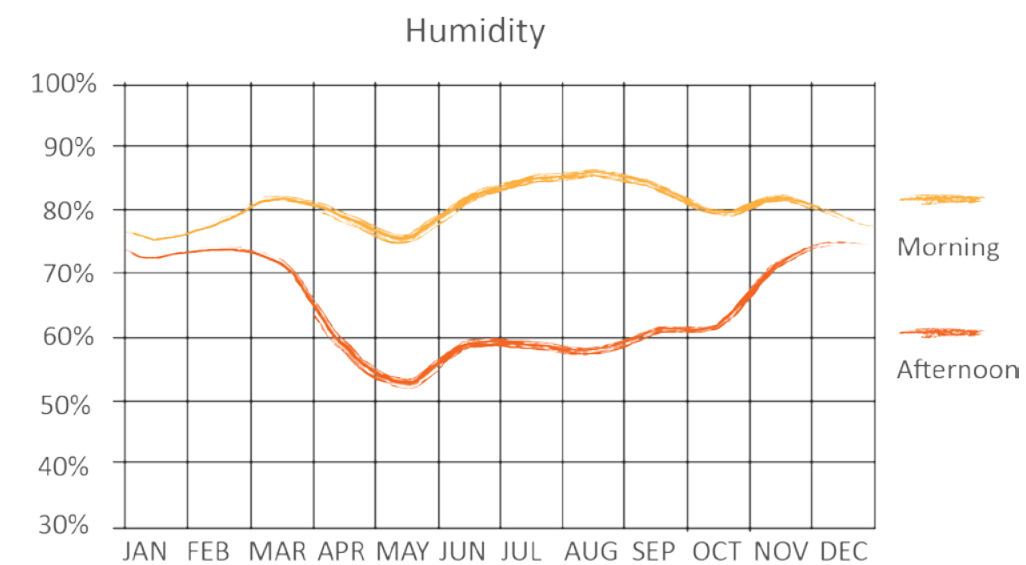
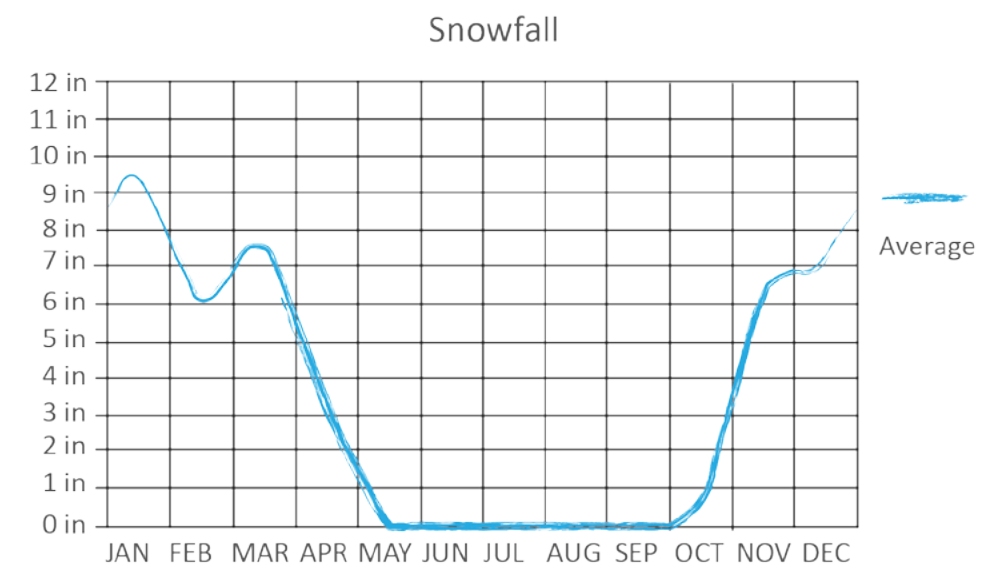
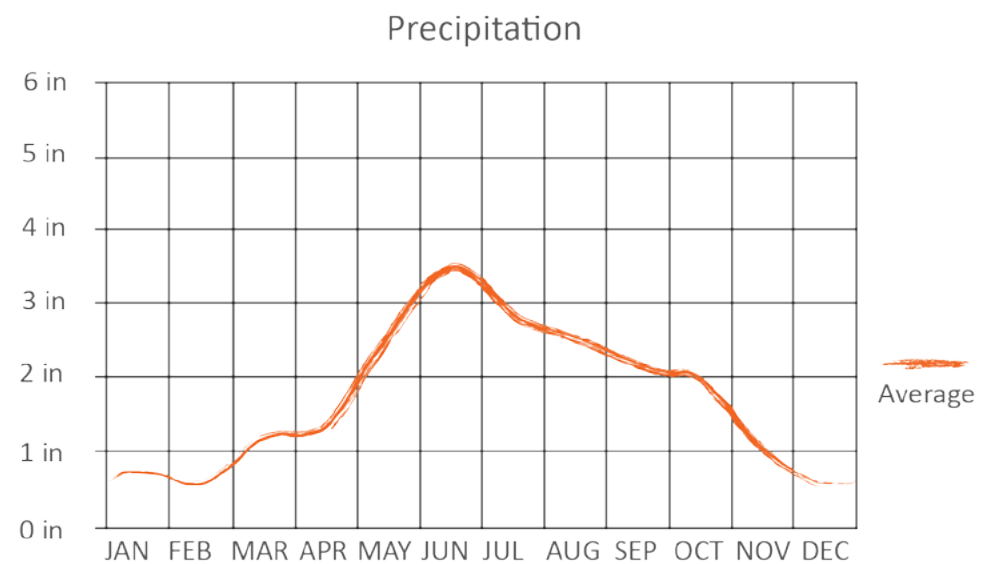
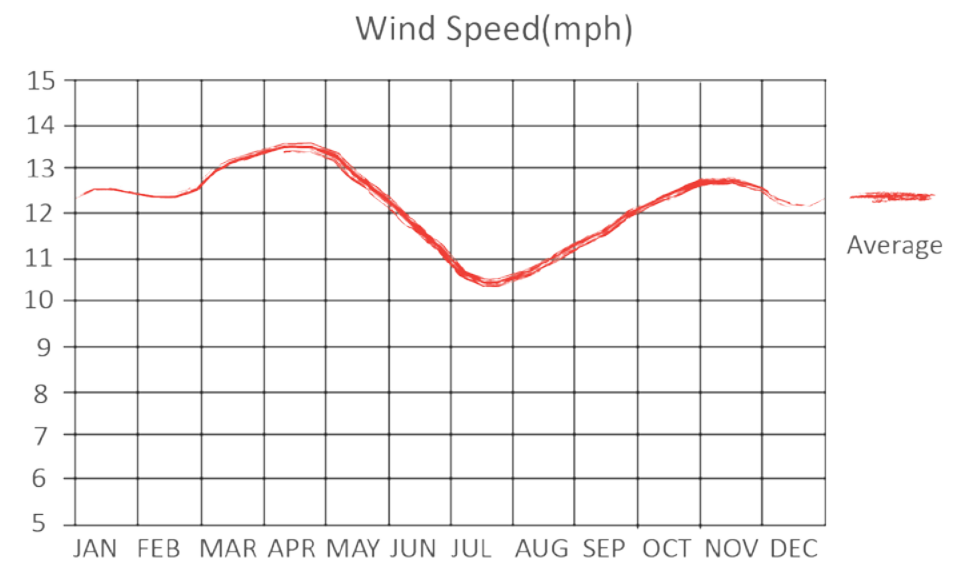
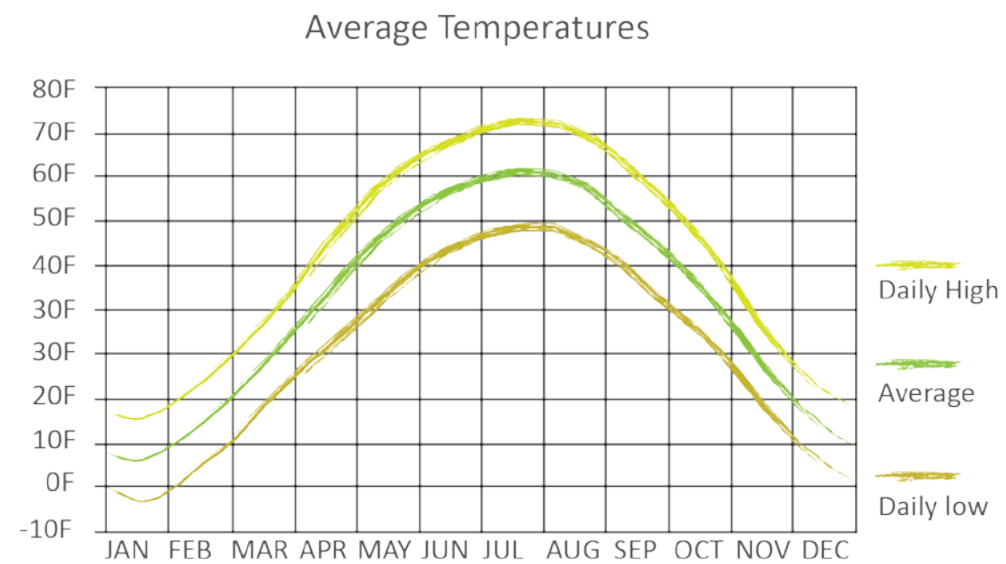
THE CHOSEN SITE LOCATION OF THE NDSU LIBRARY WOULD CREATE A BROKEN CONNECTION BETWEEN THE CORE STRUCTURES.

COST

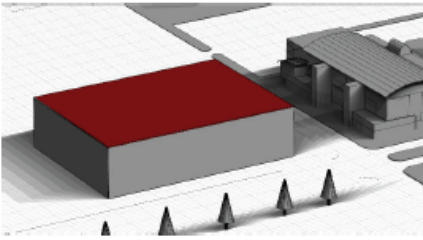
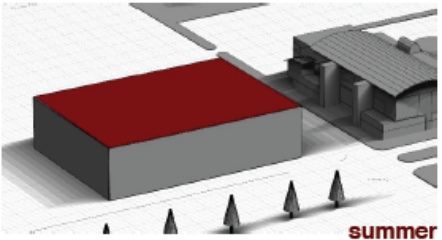
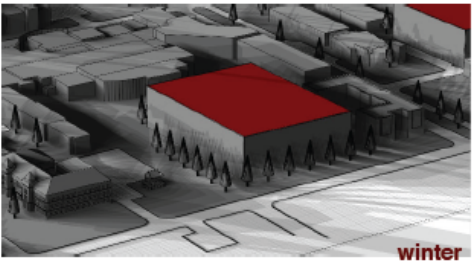
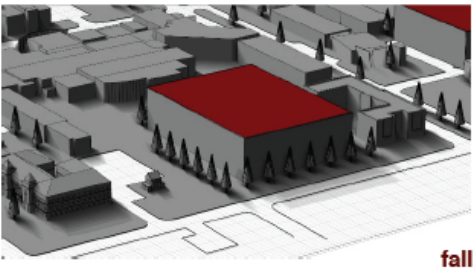
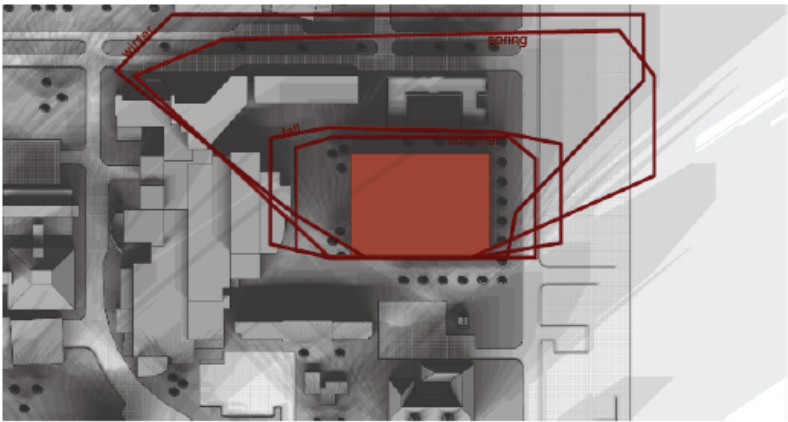
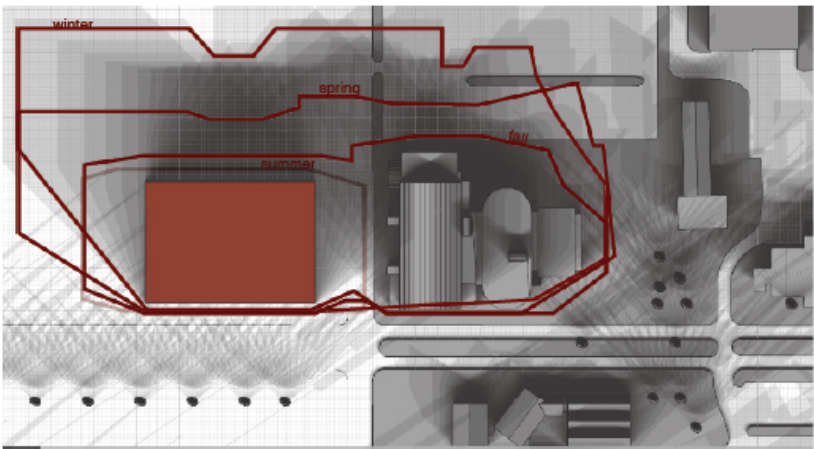
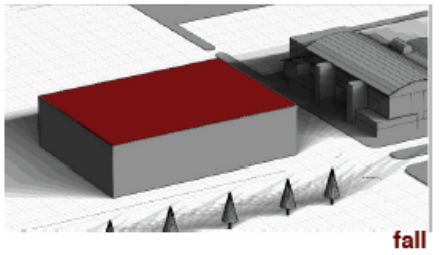
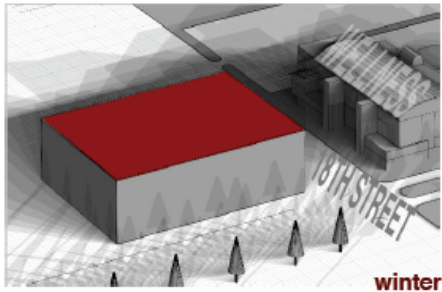
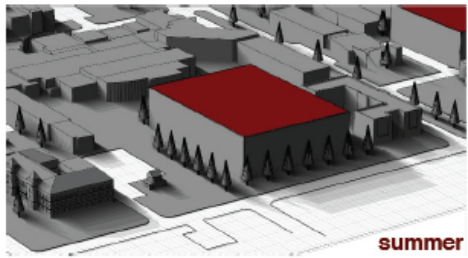
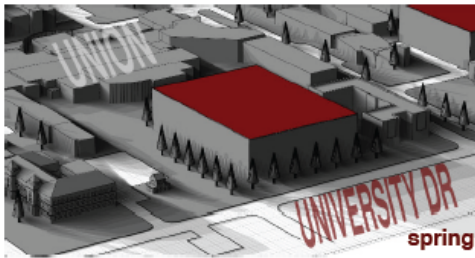
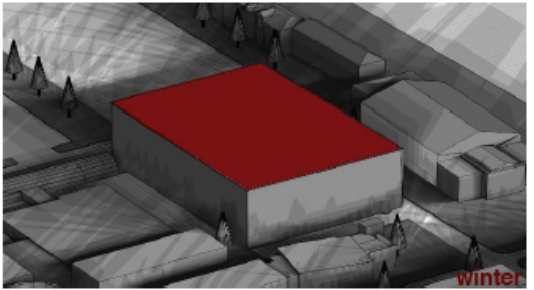
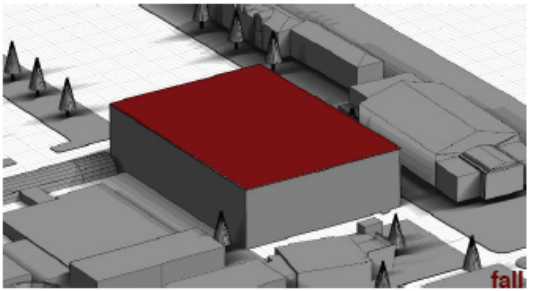
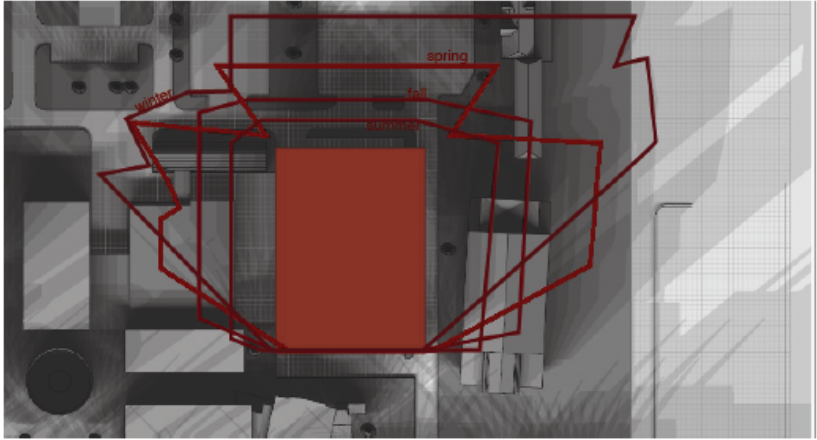
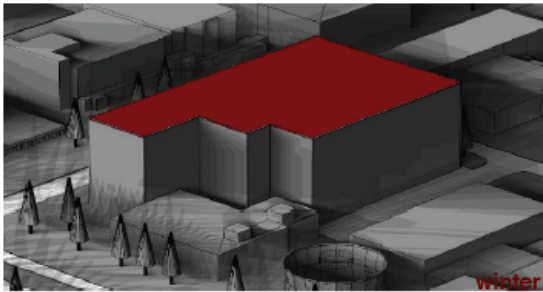
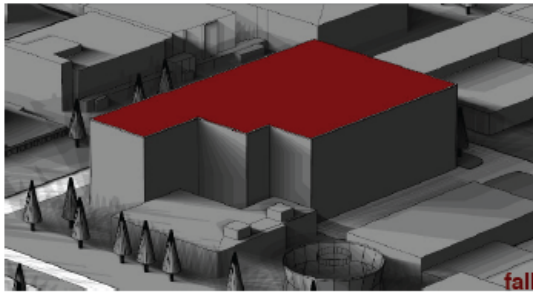
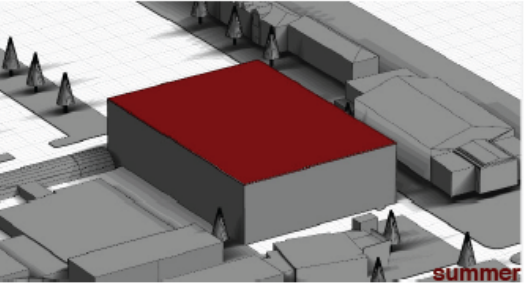
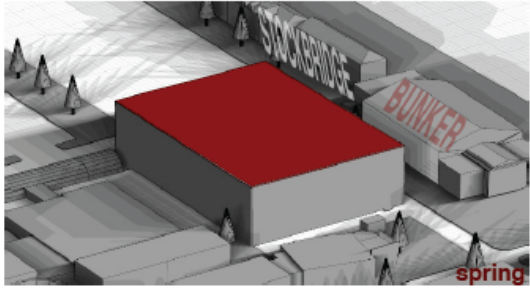
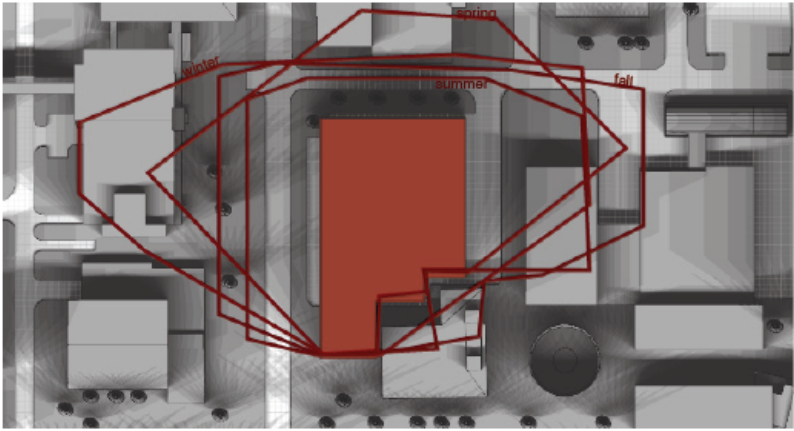
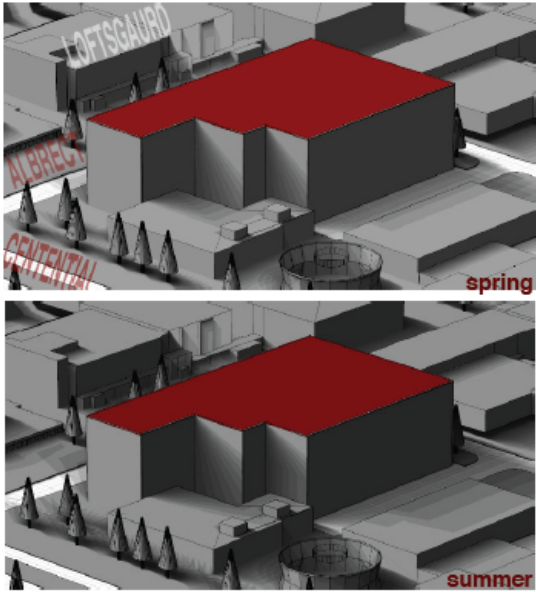
SITE OPTION FOUR WILL HAVE A LARGE UTILITY COST WHEN DEALING WITH CLIMATIC ISSUES THAT NORTH DAKOTA HAS TO DEAL WITH; PREVAILING WINDS AND WINTER CLIMATE. HEATING AND UTILITY COSTS WOULD BE A LARGE SETBACK TOWARDS THE SUCCESS OF THE BUILDING.

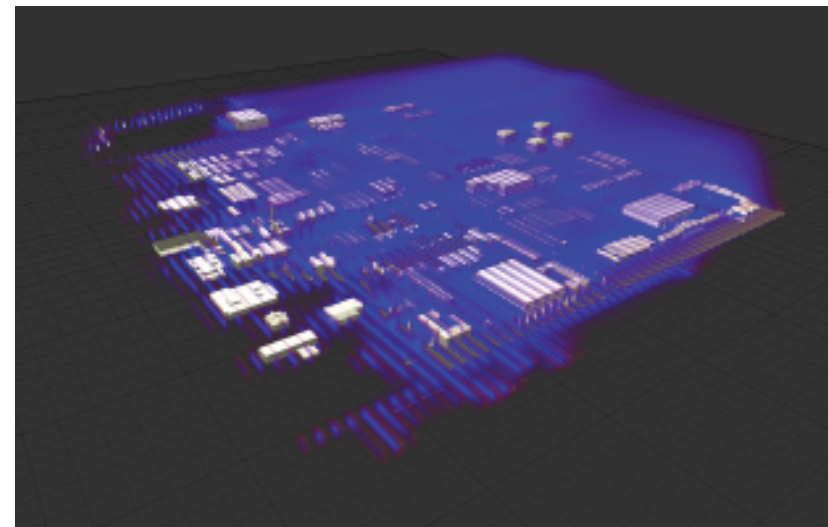
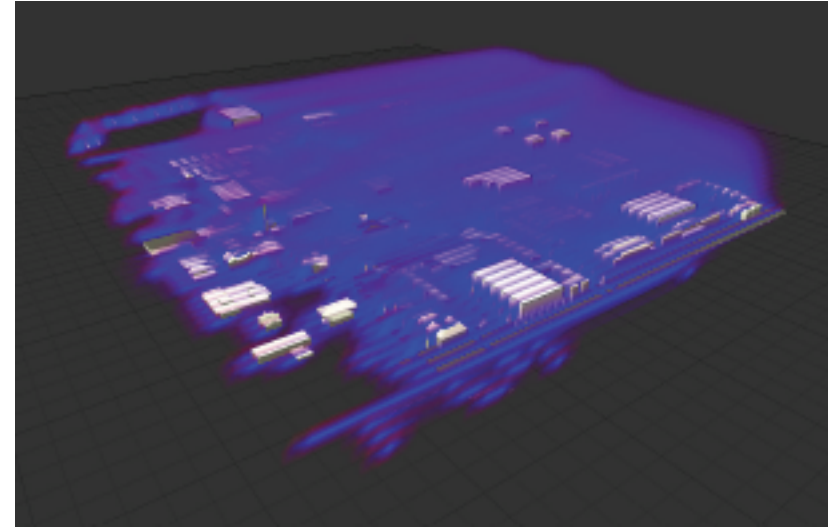
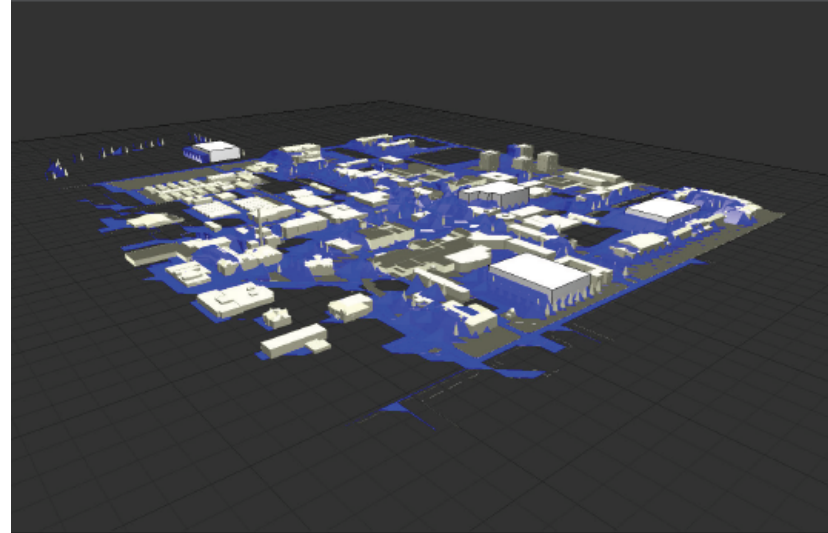
LOSS OF GREENSPACE

THE PLACEMENT OF THE BUILDING WOULD TAKE AWAY PART OF THE NDSU RESEARCH FACILITY AND LAND PLOTS.



SHADE AND SHADOW ANALYSIS



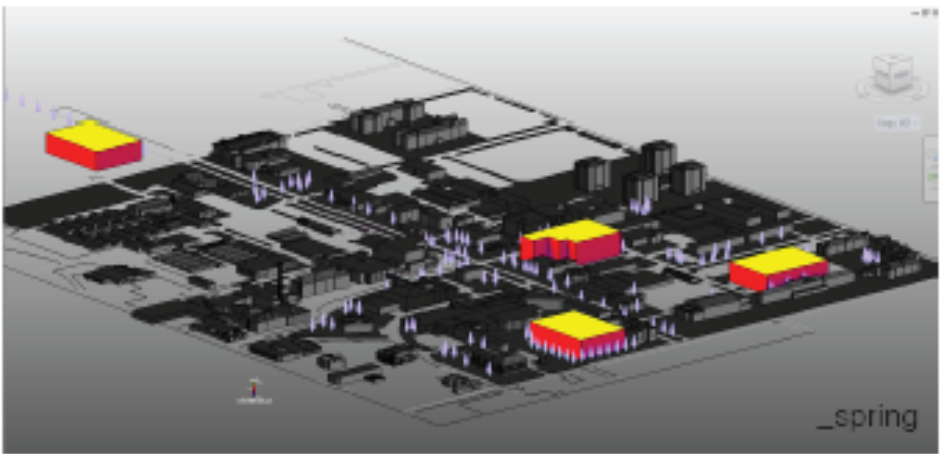
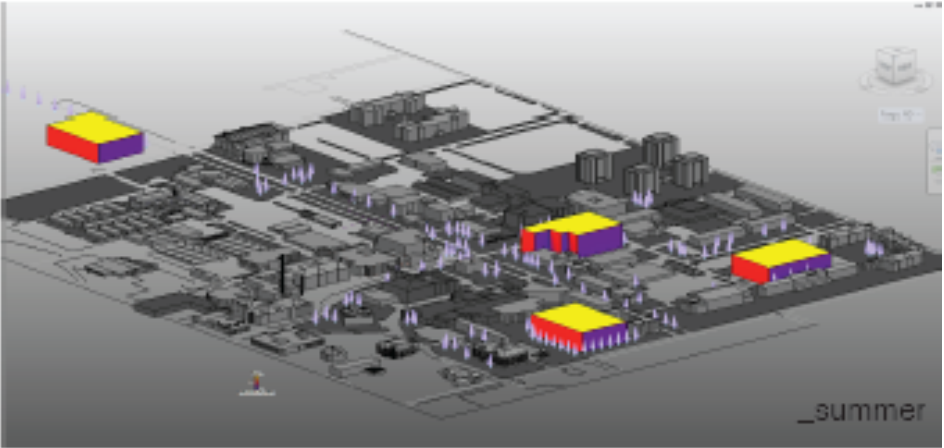
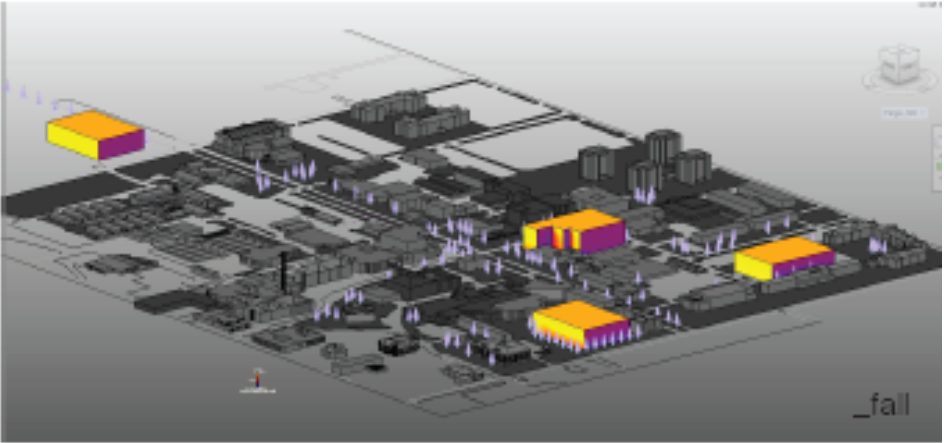
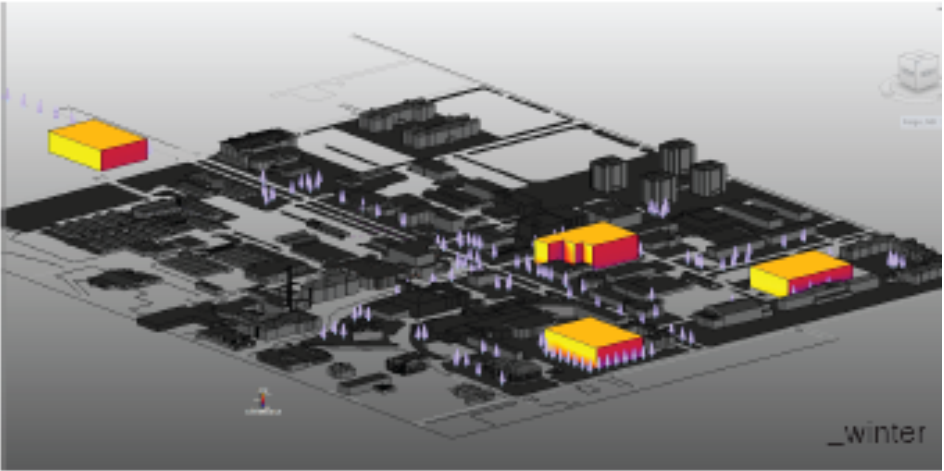
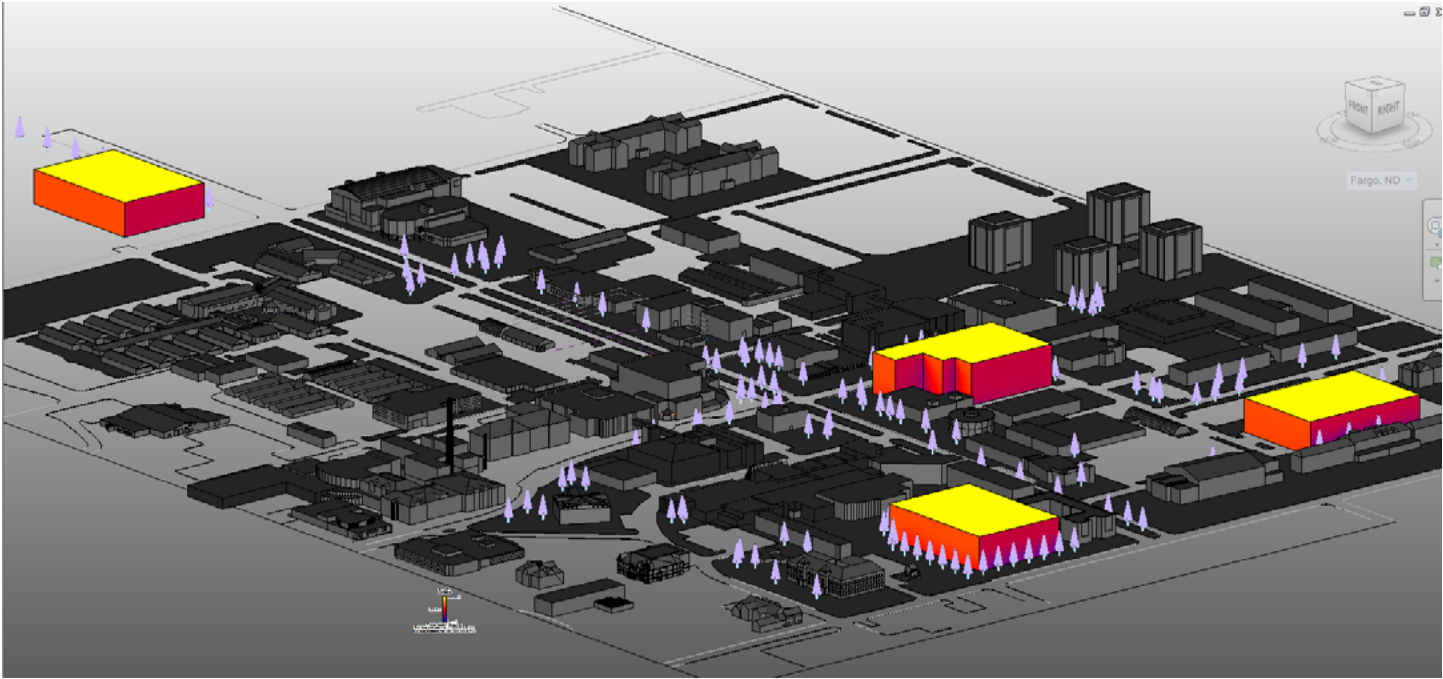


THERMAL ANALYSIS

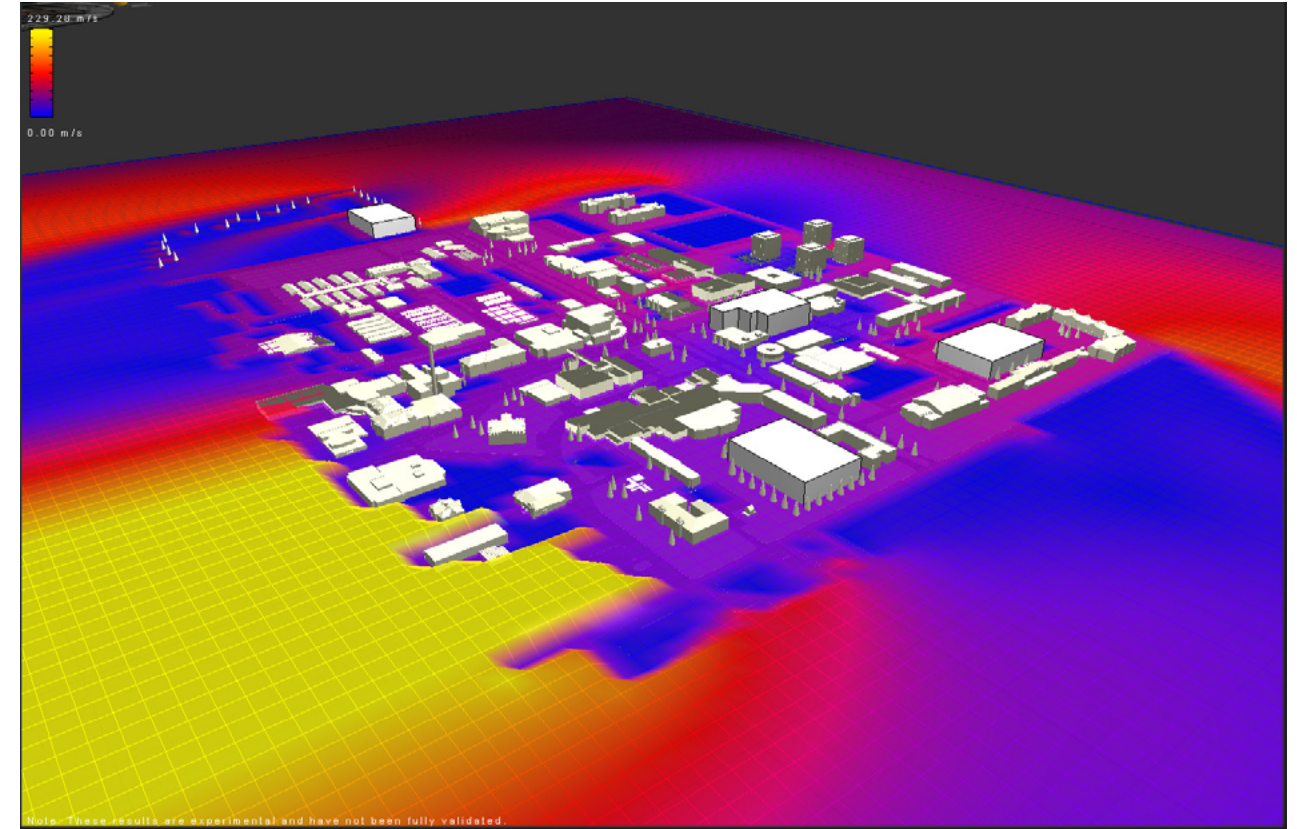
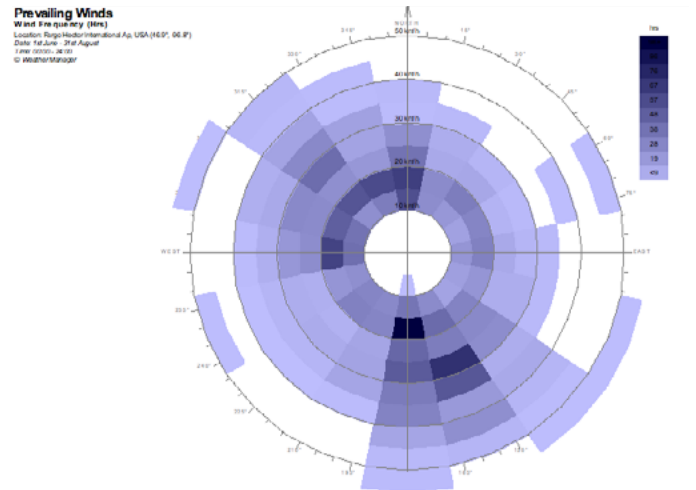
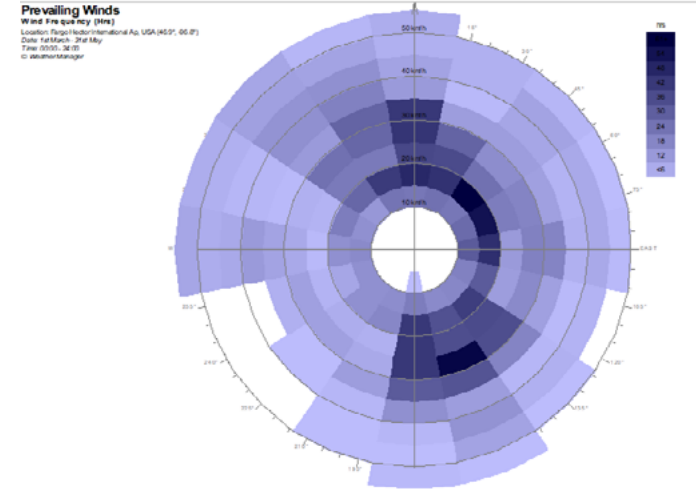
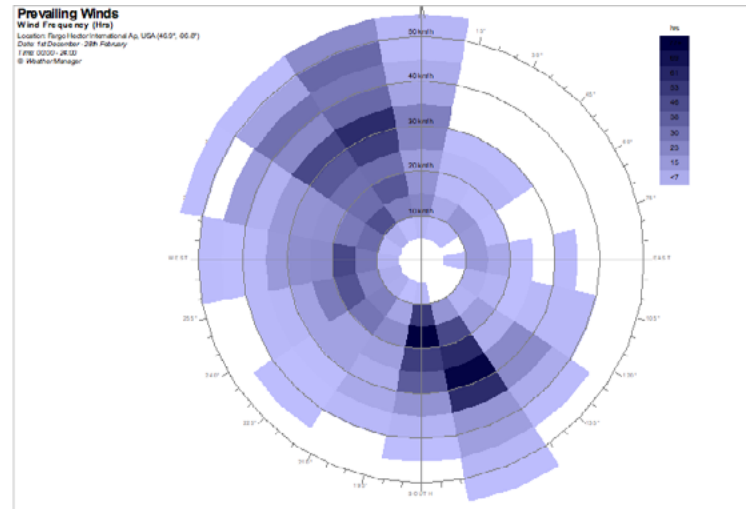
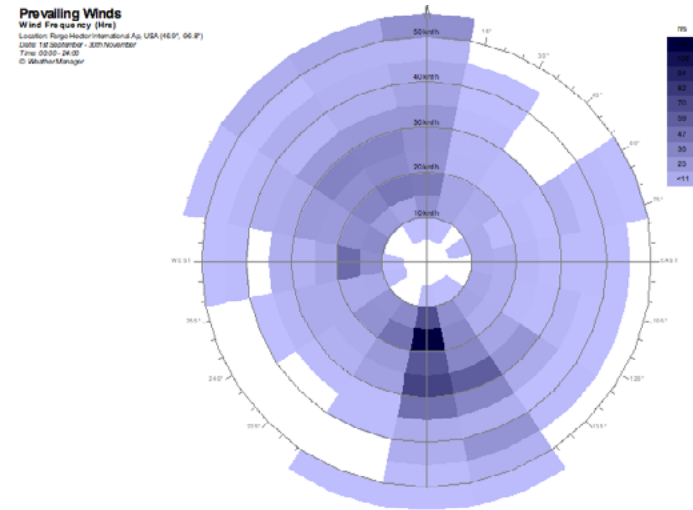
THE THERMAL PERFORMANCE OF ANY SITES IS DETERMINED BY THE SURROUNDING ELEMENTS. PARTICULARLY, A SITE ENCLOSED FROM ALL DIRECTIONS THERMALLY PERFORMS BETTER THAN THE ONE EXPOSED ON ALL SIDES. SITES THAT ARE HOLDING A LARGE VOLUME ARE PROTECTED FROM THERMAL CONDUCTION.

INTERNAL TEMPERATURE OF ANY BUILDING WILL ALWAYS TEND TOWARDS THE LOCAL MEAN OUTDOOR TEMPERATURE. ANY FLUCTUATIONS IN OUTSIDE TEMPERATURE OR SOLAR LOAD WILL CAUSE THE INTERNAL AIR TEMPERATURE TO FLUCTUATE IN A SIMILAR WAY, THOUGH DELAYED AND DAMPENED SOMEWHAT BY THERMAL CAPACITANCE AND RESISTANCE WITHIN THE BUILDING FABRIC. WHEN THE TOTAL OF ALL HEAT LOSSES BECOME EQUAL TO THE TOTAL OF ALL GAINS, THEN INTERNAL TEMPERATURES STABILIZE.

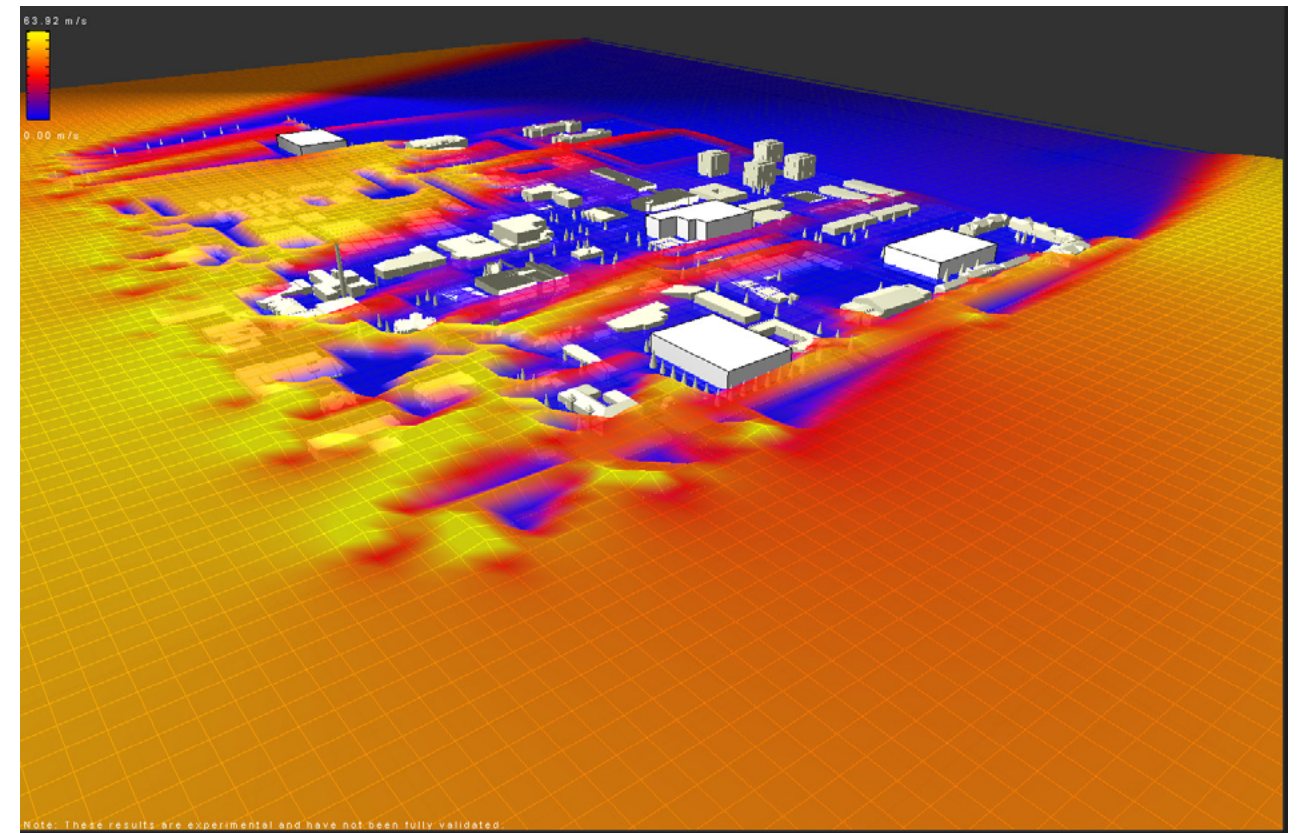
SOLAR RADIATION ANALYSIS



WIND ANALYSIS



WIND TUNNEL ANALYSIS



DESIGN. MATRIX

- site analysis
- transportation
 - +pedestrian circulation
 - +user types
 - +vehicular circulation
 - +transit routes
 - viewsheds
 - +cohesiveness and flow
 - +views and points of interest
 - +centralization
 - +green space
 - street types
 - +mixed use potential
 - +transit routes
 - +circulation

	s1	s2	s3	s4
pedestrian circulation	10	8	8	2
transit & entrance points	9	9	8	2
cohesiveness & flow	8	10	7	2
mixed use potential	0	10	2	10
views & points of interest	0	10	6	10
greenspace	0	8	5	6
centralization	10	8	8	2
design focus: on-campus residents	8	5	7	2
design focus: off-campus residents	2	5	3	8
	47/90	73/90	54/90	44/90

DESIGN. MATRIX

performance analysis

	s1	s2	s3	s4
site impact	4	6	3	10
shade & shadow	5	7	8	10
solar radiation	6	10	6	10
thermal analysis	6	8	8	3
wind tunnel	10	8	8	6
geothermal potential	5	5	7	10
photovoltaic potential	6	8	6	10
natural lighting	5	8	5	8
	47/80	60/80	51/80	67/80
total annual energy cost	\$216,000	\$201,000	\$212,000	\$225,000
net carbon emission	149 SUV	140 SUV	148 SUV	170 SUV

Suv Equivalency: 15,000 miles driven annually; 14 miles per gallon (5.95 km per liter).

	s1	s2	s3	s4
site analysis	47/90	73/90	54/90	44/90
performance analysis	47/80	60/80	51/80	67/80
TOTAL	94/170	133/170	105/170	111/170

SITE TWO: CHURCHILL FIELD



SITE ANALYSIS

CHURCHILL FIELD IS A CENTRALIZED LOCATION ON THE NDSU CAMPUS. THE CENTRALIZED POSITION OF THE LIBRARY WILL PROVIDE EASY ACCESS TO SURROUNDING DORMITORIES. THE MEMORIAL UNION, THE FAMILY LIFE CENTER, THE DEPARTMENT OF HUMAN DEVELOPMENT, AND VARIOUS OFF-CAMPUS APARTMENTS. PEDESTRIAN CIRCULATION IS CENTRALIZED AROUND THE MEMORIAL UNION. BUSY PEDESTRIAN FLOW CONCENTRATION HAPPENS BETWEEN ALBRECHT BOULEVARD AND THE BABBLING BROOK LOCATED JUST WEST AND SOUTHWEST OF THE UNION WILL FOCUS ON THE NORTH PORTION OF CAMPUS. POSSIBLE MIXED-USE BUILDINGS CAN BE SECURED ACROSS FROM THE NEW LIBRARY SPACE. LOCAL BUSINESSES CAN HELP TERM UNIVERSITY DRIVE AS THE TRADITIONAL COIN THE TERM TO ITS ORIGINAL MEANING AS A CENTRALIZED DRIVE CIRCULATED NEXT TO OR LEADING UP TO CAMPUS. THIS AREA COULD RESEMBLE THE INTERSECTION OF ALBRECHT AND 12TH AVENUE SOUTH. THE MEMORIAL UNION PLAZA WILL BE UTILIZED PROPERLY AS AN ENTRANCE AND GATHERING SPACE WOULD NOW SERVE TWO LANDMARK STRUCTURES ON CAMPUS: THE MEMORIAL UNION AND THE LIBRARY. AFTER A CIRCULATION ANALYSIS, THERE WERE NO ACTIVITIES THAT WENT ON AT CHURCHILL FIELD DURING VISITATIONS. THE LOSS OF THIS GREEN SPACE CAN BE REINTRODUCED USING GREEN SUSTAINABLE DESIGN.

VIEWS AND VISTAS

CHURCHILL FIELD PROVIDES A WIDE RANGE OF VIEWS OF THE CAMPUS, ESPECIALLY OF THE EXISTING PLANT SURROUNDINGS. THE SITE GIVES THE SPACE A UNIQUE NATURAL CHARACTER TO THE SITE. ON THE WEST IS THE MEMORIAL UNION THAT CONTINUOUSLY BREATHS STUDENTS. THIS PARTICULAR SITE HAS A LOT OF POTENTIAL FOR LANDSCAPING. EVEN THOUGH THIS IS AN IMPORTANT GREEN SPACE RECOGNIZED BY THE CAMPUS MASTER PLANNING, I THINK A GREENER BUILDING WOULD HELP BRIDGE THAT GAP.

EXISTING GRIDS

BUSY PEDESTRIAN FLOW CONCENTRATION HAPPENS BETWEEN ALBRECHT BOULEVARD AND THE BABBLING BROOK LOCATED JUST WEST AND SOUTHWEST OF THE UNION. THE SITE ALSO HAS A GRID AROUND IT THAT IS USED BY STUDENTS AS A WALKWAY.

EXISTING MATERIAL TEXTURES

THE SITE IS COVERED WITH GRASS, TREES, AND VEGETATION. THERE IS A CONCRETE WALKWAY AROUND THE SITE THAT PRIMARILY IS USED BY PEDESTRIANS.

BUILT FEATURES

THE SITE IS SURROUNDED BY DORMITORIES, THE MEMORIAL UNION, THE FAMILY LIFE CENTER, THE DEPARTMENT OF HUMAN DEVELOPMENT, AND ALL THE RESIDENTIAL APARTMENTS. ALL THESE BUILDING FEATURES AROUND THE SITE PROVIDE A THERMAL POOL FOR THE SITE.

LIGHT QUALITY

WHEN DESIGNING ENERGY EFFICIENT BUILDINGS, SOLAR RADIATION CAN PLAY AN IMPORTANT ROLE IN DETERMINING BUILDING FORM. ON ONE HAND, ENERGY FROM THE SUN CAN BE HARNESSSED THROUGH SOLAR PASSIVE DESIGN AND AS A RENEWABLE ENERGY SOURCE USING PHOTO-VOLTAIC SYSTEMS; ON THE OTHER HAND, SOLAR RADIATION ALSO REPRESENTS THE LARGEST SOURCE OF HEAT GAIN IN BUILDINGS, WHICH CAN CAUSE A SIGNIFICANT DEMAND OF ENERGY TO KEEP A BUILDING COOL. THE PARTICULAR SITE PROVIDES ALL THE FEATURES REQUIRED FOR A PASSIVE SOLAR DESIGN.

VEGETATION

CHURCHILL FIELD PROVIDES A DIVERSE RANGE OF VEGETATION. TREES RANGE FROM CONIFEROUS, PINE AND OAK. DUE TO THE LOW ANGLE OF THE SUN IN THE WINTER, THESE TREES WILL PROVIDE A UNIQUE LIGHTING EXPERIENCE TO READERS.

WATER

AVAILABILITY OF WATER IS NOT SEEN IN THE SURROUNDING LOCATION OF THE PROPOSED SITE, ALTHOUGH THERE IS A POSSIBILITY OF RAIN WATER HARVESTING THAT CAN BE USED TO LINK AN UNDERGROUND WATER TABLE.

WIND

FARGO USUALLY GETS A LOT OF WIND FROM THE SOUTHEAST IN SUMMER AND THE NORTHWEST IN THE WINTER. ESPECIALLY IN AREAS WHERE THERE ARE BUILT FEATURES, THIS DEVELOPS A WIND TUNNEL EFFECT BY MAKING THE WALKWAYS EVEN WINDIER. THE CHURCHILL FIELD SITE IS SURROUNDED BY BUILDINGS ON THREE SIDES AND BY LANDSCAPING ON THE FOURTH SIDE, MAKING THE LOCATION IDEAL FOR BUILDING WITH CONSISTENCY IN TEMPERATURE FOR THE AIR VOLUME BUILT UP ON THE SITE.

HUMAN CHARACTERISTICS

DESPITE ITS ATTACHMENT WITH NATURE, THE SITE IS NOT SUCCESSFUL AS A GREEN SPACE AND IS FREQUENTED USED BY STUDENTS CUTTING ACROSS BUILDINGS. WITH THE FUTURE DEVELOPMENT OF THE SITE, THIS CONNECTION WITH NATURE LENDS ITSELF TO A WHOLE LIST OF ISSUES THAT COULD BE ADDRESSED WITH THE BUILDING.

DISTRESS

THE SITE IS CURRENTLY BEING USED BY STUDENTS AS A GREEN SPACE; THEREFORE, CONTROVERSY OVER ITS FUTURE DEVELOPMENT INTO SOMETHING ELSE IS HIGHLY LIKELY. THE SITE HAS SPARKED CONTROVERSY OVER ITS FUTURE DEVELOPMENT INTO SOMETHING ELSE, PEOPLE HAVE BECOME ATTACHED TO THE IDEA OF GREEN SPACE, THE CONCEPT THEY BARELY UNDERSTAND.

QUANTITATIVE ASPECTS

SOILS

BED ROCK IS GENERALLY FOUND 60 FEET BELOW GRADE IN FARGO. FOR THIS PARTICULAR SITE, THE BED ROCKS IS AT ABOUT 85 FEET. IF THE BUILDING FOUNDATION REQUIRES CAISSON STRUCTURE, THE COST OF CONSTRUCTION WILL BE SUBSTANTIALLY MORE. THE AVERAGE FROST PERPETRATION IS ABOUT 4.5 FEET, AND SINCE THIS BUILDING WILL GO AT LEAST 15 FEET BELOW GRADE, THE FOUNDATION WILL BE BELOW FROST LEVELS.

THE SPECIFIC SOIL FALLS UNDER FARGO/SILT CLAY SOIL. THIS SOIL RESISTS DRAINAGE AND FORM SWALE IN UNNECESSARY PLACES. FARGO/SILT CLAY SOIL CAN BEAR UP TO 2000LBS PER SQUARE FOOT, WHICH IS COMPARATIVELY LESS THAN OTHER PLACES.

WATER TABLE

GROUNDWATER:

ACCORDING THE USGS, GROUND WATER IS 30-75 FEET BELOW GRADE FOR THE PARTICULAR SITE.

SURFACE WATER AND STORM WATER RUNOFF:

THE SOIL FOUND IN THE REGION RESISTS WATER SEEPAGE, CREATING STANDING WATER IN UNWANTED PLACES.

UTILITIES

TEN FEET OF UTILITY EASEMENTS IS REQUIRED BY THE CITY OF FARGO CENTERED ON THE LOT LINES. MORE INFORMATION ON STORM WATER MANAGEMENT CAN BE FOUND IN TITLE THREE CHAPTERS EIGHT OF THE CITY OF FARGO CODE.

VEHICULAR TRAFFIC

THE VEHICULAR TRAFFIC AROUND THE SITE IS MINIMAL DUE TO THE WALKABILITY OF THE CAMPUS. HOWEVER, THERE ARE ROADS ON ONE OF THE FOUR SIDES OF THE SITE THAT EXPERIENCE BUSY TRAFFIC ALMOST ALL DURING THE SCHOOL DAYS BUT IS NONEXISTENT ON THE WEEKENDS. ALBRECHT BLVD AND UNIVERSITY DR, THE BUSIEST ROAD ON THE NDSU CAMPUS DESIGNED TO BE CROSSED ONLY AT THE STREET CORNERS, THIS IS IMPORTANT BECAUSE IT KEEPS PEOPLE ON THE SIDEWALKS ALONG THE SITE FOR A WHOLE BLOCK.

PEDESTRIAN TRAFFIC

PEDESTRIAN TRAFFIC RULES THIS SITE AND ITS PERIMETER. THE WEST AND THE EAST SIDES OF THE SITE EXPERIENCE STRONG NORTH AND SOUTH TRAFFIC FROM STUDENTS TRAVELING FROM AND TO CLASS OR FROM THE DORMS TO CLASS. THE NORTH AND SOUTH SIDES OF THE SITE HAVE MINIMAL TRAFFIC, BUT WHEN THERE IS TRAFFIC, IT IS ALMOST ALWAYS PEOPLE CUTTING ACROSS THE GRASS FOR A SHORTER PATH THAN THE SIDEWALK.

TOPOGRAPHICAL SURVEY

THE RED RIVER AREA IS A VERY FLAT PLACE WITH LITTLE VARIANCE IN TOPOGRAPHY. THE NDSU CAMPUS IS FLAT WITH A SLOPE OF LESS THAN ONE %. CHURCHILL HALL, CURRENTLY LOCATED ON THE FUTURE LIBRARY SITE IS DESIGNED TO DRAIN THE WATER TO SEVERAL DRAINS IN THE CENTER OF THE LOT.

VISUAL FORM

THE CONTEXT OF THE LAND IS THAT OF AN URBAN SETTING WITH BUILDINGS DEFINING THE LANDSCAPE. IN THE CASE OF THIS SITE, THE MOST DOMINATING ELEMENTS ARE THE GREEN SPACE AND THE CANOPY OF TREES AROUND THE SITE.

PLANT COVER

THE SITE CURRENTLY IS VERY MONOLITHIC WITH ALL ARTIFICIALLY PLACED PLANTINGS.

THE FOLLOWING TREES HAVE POTENTIAL TO GROW ON THE SITE IF PLANTED ACCORDING TO THE SOIL SURVEY:

- 8-15": CHOKECHERRY, EASTERN RED CEDAR, AMERICAN PLUM, SIBERIAN, PEA SHRUB, AND TATARIAN HONEYSUCKLE
- 16-25": BLACK HILLS SPRUCE, BLUE SPRUCE
- 26-35": SIBERIAN ELM, GREEN ASH
- >35": EASTERN COTTONWOOD

SITE CHARACTER

CHURCHILL FIELD IS A CENTRALIZED LOCATION ON CAMPUS. THE CENTRALIZED POSITION OF THE LIBRARY WILL PROVIDE EASY ACCESS TO THE SURROUNDING DORMITORIES, THE MEMORIAL UNION, THE FAMILY LIFE CENTER, THE DEPARTMENT OF HUMAN DEVELOPMENT AND VARIOUS OFF-CAMPUS APARTMENTS.

NDSU Main Library

Fargo, ND

Subject: Energy Efficient Library Pre-Design– Meeting Notes

Date: January 6, 2012

Present: Michele Reid - Dean of the Libraries (Chair Library Comm.)
Ankit Rauniyar - Graduate Research Assistant (Architecture)

Note: Originally schedule for January 5th this meeting was postponed due to schedule conflict.

The following represents our understanding of issues discussed.

Purpose of the meeting:

The key idea of this meeting was to discuss qualitative aspects of the new library, evaluate various design strategies that would be essential for the development of the new library design.

Discussion Notes:

- Ankit Rauniyar opened the meeting with a preliminary building space program for review with Michele. Program spread sheet, basic floor plan developed using passive solar design and typical libraries images were included to illustrate what has been discussed to-date in terms of size and need.

The following design related comments were made:

- Michele Reid suggested that the new library should focus on providing a flexible space that could be adjusted to accommodate changing needs. She felt that even though the new library is stack based, the design should address a secondary use of the space if stacks are eliminated as more things are electronic. Michele believes that the library space has to be functional above all and should be done efficiently using modern methods without losing its traditional essence of a library. She also liked the idea of dividing building in various zones that could be isolated with its use. As Ankit discussed various libraries, Morgan library (New York) was a particular interest to her. Ankit also mentioned the Fargo public library, which Michele thought was a successful building but did lack a main entrance and group collaborative spaces. From a review of the plans, Michele noted that more individual or small study spaces were needed. Other characteristics of the new library should include.
 - Use of locally produced materials, wood and stone finishes.
 - Landscaping that was integrated with the building.
 - Adequate natural lighting and interior planting that gives indoor/outdoor feel.
 - Use of neutral colors (not stark white).
 - Atrium space that looks at the reading room.

The next meeting is scheduled for January 27th from 9.30am to 10.30am.

Report by:
Ankit Rauniyar

CC: Michele Reid, Alissa Kuntz, David A. Crutchfield, Ashley Kaisershot

- Together Michel and Alissa suggested that if the library building were located either in the Churchill site or the site next to Wellness Center, they could be connected using an elevated walkway to Memorial Union and Wellness Center respectively.
- There were also thoughts about whether the library would benefit by being placed next to the Wellness Center in terms of its use frequency/numbers and the committee would be curious to know the current/historical use-statistics for the Wellness Center.
- Michele felt that the research was moving in the right direction and would be important for to present the information to the Building Committee next semester.

The next presentation to the Building Committee is to be schedule next semester.

Report by:
Ankit Rauniyar

CC: Michele Reid, Alissa Kuntz, David A. Crutchfield, Ashley Kaisershot

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Essential

Desirable

Not Needed



	Entrance and Lobby	Check-Out Space	Administrative Offices	Total Collection Space	Classroom Spaces & Theater	Lounge Spaces	Center for Writers	Wireless Lounge	Food Service	24/7 Study	Faculty Study Rooms	Graduate Study Rooms	Faculty Collaborative Space	Visiting Scholars Area	Seating Space	Individual Study	Group Study	Staff Work Area	Meeting Area	Circulation	Mechanical Room	Display/Gallery/Viewing
Entrance and Lobby																						
Check-Out Space																						
Administrative Offices																						
Total Collection Space																						
Classroom Spaces & Theater																						
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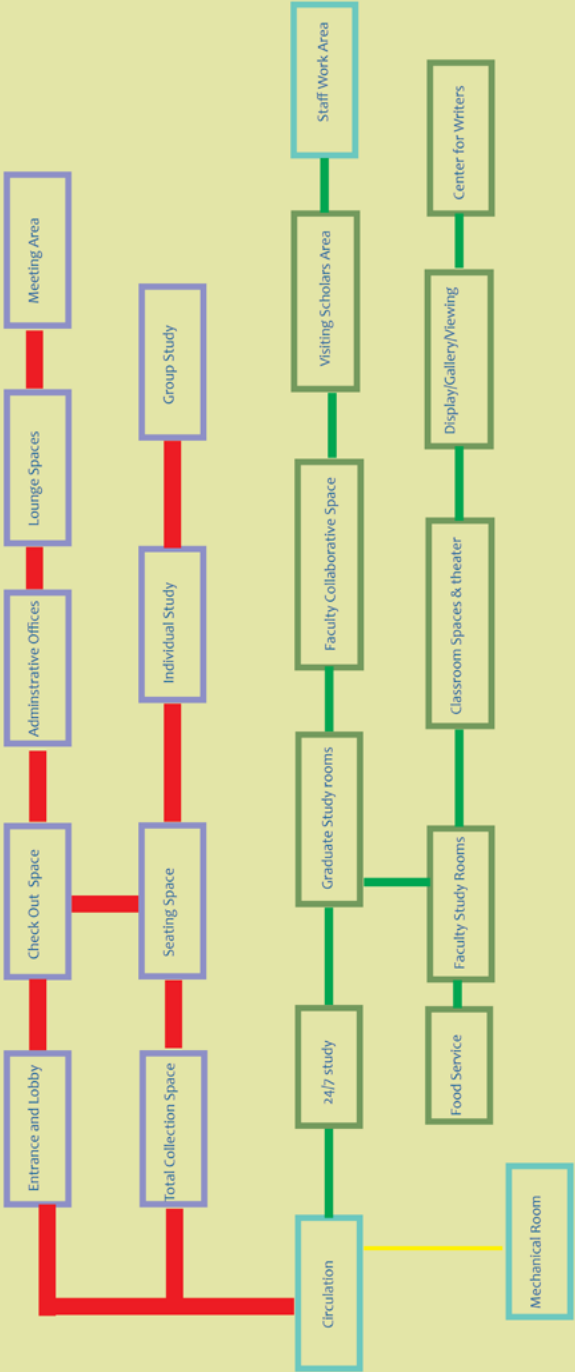
Interaction Net

Legend:

Formal Connection

Informal Connection

Casual Connection



BUILDING PROGRAM

NDSU Main Library

Student Population 14,200

Current Space	Future Expansion		
Total Collection Space	44,972	3	140000
User Seating Space	23,125	2	46000
Staff Work Area	6,000	2	12000
Meeting Area	1,000	2	2000
Special Use	1,336	3	3000
General spaces	26,000	2	40000
Classroom Spaces	12,000	2	24000
Lounge Spaces	5,000	1	5,000
Lounge wireless	12,000	1	10,000
Center for Writers	4,000	1	4,000
Food Service	400	1	400
24/7 study	6000	1	6000
Faculty Study Rooms	3000	1	3000
Graduate Study rooms	4000	1	4000
faculty collaborative space	2000	1	2000
visiting scholars area	2000	1	2000

Total Square Footage 102,433 303,400

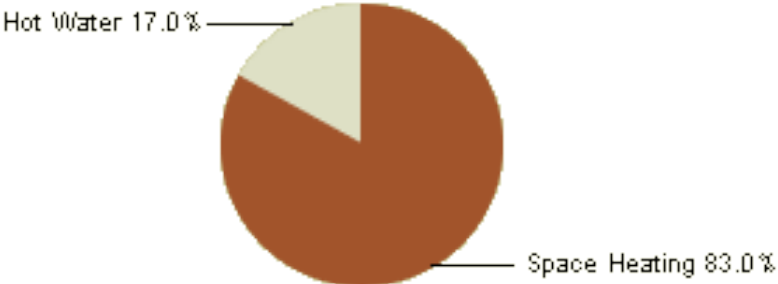
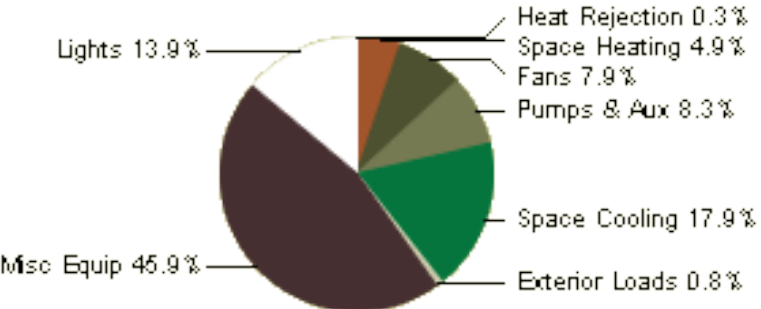
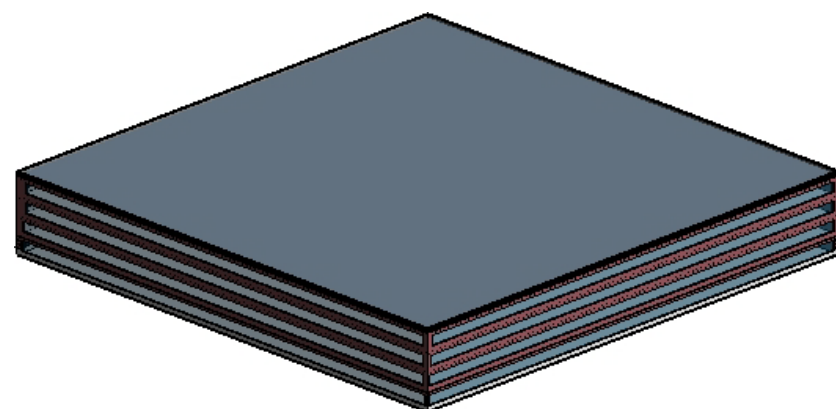
	Per Sq Ft	Sq Ft	Future expansion		
Folio (Oversize) – 1 st floor:	6,873	5	1374.6	4	5498.4
Reserve Collection – 1 st floor:	549	10	54.9	4	219.6
Federal Documents – 2 nd floor:	92,478	10	9247.8	1	9247.8
State Documents – 2 nd floor:	8,850	10	885	1	885
Federal Documents Maps – Lower Level	60,289	50	1205.38	1	1205.38
Shott Collection – 1 st floor: 1,817	1,817	10	181.7	1	181.7
Media – 1 st floor: 2,382	2,382	10	238.2	4	952.8
Media Audio Book: 123	123	20	6.15	4	24.6
Media CD Audio: 588	588	20	29.4	4	117.6
Periodicals – 1 st floor: 20,092	20,092	25	803.68	1	803.68
Rare Books – 1 st floor: 1,929	1,929	5	385.8	1	385.8
Stacks – 2 nd floor: 290,917	290,917	10	29091.7	4	116398.8
Thesis – 2 nd floor: 9,160	9,160	10	916	3	2748
GRHC (Germans from Russia Heritage Collection) – 1 st floor: 11,042	11,042	20	552.1	1	552.1
Total Collection Space			44972.21		###
Public Access Computer(20 sit down and 20stand up)PAC	40	30	1200	2	2400
Electronic Work Stations(1 per 200 students)	70	45	3150	2	6300
microfilm reader/printer	5	35	175		
Seating Space 20 Seats Per 1000					
Seats	340	30	10200	2	20400
Individual Study rooms(2 per 1000)	28	25	700	2	1400
Group Study 1 per 1000)	14	50	700	2	1400
Total User Seating Space			23125		
Staff Work Area	40	150	6000	2	12000
Meeting Area	40	25	1000	2	2000
Special Use					45900
Newspapers	2	25	50	2	100
Paper Back	2	35	70	2	140
Microfiche – Lower Level:	1,037	50	20.74	2	41.48
Maps – Lower Level:	755	10	75.5	2	151
Maps Roll File – Lower Level:	207	10	20.7	2	41.4
Photocopies/scanning	4	50	200	2	400
Staff lounge/break	4	80	320	2	640
Vertical Files	10	10	100	0	0
Index table	2	140	280	2	560
Display case	20	10	200	4	800
			1336.04		2873.88
Classroom Spaces & theater			12000	2	24000
Lounge Spaces			5000	1	5000
Center for Writers			4000	1	4000
Lounge wireless			12000	1	12000
Food Service			400	1	400
24/7 study			6000	1	6000
Faculty Study Rooms			3000	1	3000
Graduate Study rooms			4000	1	4000
faculty collaborative space			2000	1	2000
visiting scholars area			2000	1	2000
			###		###
vestibules, security systems					
near entrances and circulation desks, c-car					
pickup area, corridors, stairwells, elevator shafts,	25 to 30%		26000		50000
and restrooms					
Total Sq. Ft			###		300000

Square Building

Building Type:	Univ. Library
Location/Climate:	Fargo, ND
Total Floor Area (sf):	300,000
Elect. Rate:	\$0.07/kWh
Fuel Rate:	\$0.96/Therm
Approx. LiveLoad (Occupants):	2,627
Ave. Lighting Pwr. Density:	1.31 W/ft ²
HVAC System:	Underfloor

Electric Power Plant Sources²

Fossil:	76%
Nuclear:	16%
Hydroelectric:	6%
Renewable:	2%



Photovoltaic Potential⁴

Annual Energy Savings:	9,903 kWh
Total Installed Panel Cost:	\$45,906 / yr
Nominal Rated Power:	6 kW
Maximum Payback Period:	44 yrs @ \$0.07 / kWh

⁴ Results based on all exterior surfaces being analyzed. Escalation rate of 2% applied to electric rate. Payback calculation does not include federal or state incentives, loan information, or tax breaks.

Wind Energy Potential⁶

Annual Electric Generation:	5,565 kWh
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⁶ A single 15 ft diameter turbine, with cut-in and cut-out winds of 6 mph and 45 mph respectively, and located at the coordinates of the weather data.

Design Alternate

Natural Ventilation Potential7

Total Hours Mech. Cooling Required:	1,859 Hours
Possible Natural Ventilation Hours:	814 Hours
Possible Annual Electric Energy Savings:	249,488 kWh
Possible Annual Electric Cost Savings:	\$16,466
Net Hours Mech. Cooling Required:	1,045 Hours 7. Assumes natural ventilation only during comfort zone periods and air changes per hour are less than 20 ACH. Building form & opening design must be able to allow stack effect or cross ventilation.

Lighting Efficiency (lighting power density)	
1	LPD 10% less than base run
2	LPD 20% less than base run
3	LPD 30% less than base run
4	LPD 40% less than base run
Lighting Control	
1	Occupancy sensors
2	Daylighting sensors & controls
3	Occupancy/Daylighting sensors & controls

HVAC	
1	11.3 EER Packaged VAV, 84.8% boiler heating
2	Central VAV, HW Heat, Chiller 5.96 COP, Boilers 84.5 eff
3	4-Pipe Fan Coil System, Chiller 5.96 COP, Boilers 84.5 eff
4	Central VAV, Electric Resistance Heat, Chiller 5.96 COP
5	2-Pipe Fan Coil System, Chiller 5.96 COP, Boilers 84.5 eff
6	Premium Eff. VAV w/ Reheat, 150-300 ton (7.0 COP)
7	Premium Eff. VAV w/ Reheat, >300 ton (7.5 COP)
8	Underfloor Air Distribution

Construction

- 1 Metal Frame Wall without Insulation
- 2 Metal Frame Wall with Code Compliant Insulation
- 3 Metal Frame Wall with High Insulation
- 4 Metal Frame Wall with Super High Insulation
- 5 Massive Wall without Insulation
- 6 Massive Wall with Code Compliant Insulation
- 7 Massive Wall with High Insulation
- 8 Massive Wall with Super High Insulation
- 9 Structural Ins. Panel (SIP) Wall 4.5in (114mm)
- 10 Structural Ins. Panel (SIP) Wall 6.5in (165mm)
- Insulated Concrete Form (ICF) Wall, 10" thick
- 11 form
- Insulated Concrete Form (ICF) Wall, 12" thick
- 12 form
- Insulated Concrete Form (ICF) Wall, 14" thick
- 13 form
- Structural Ins. Panel (SIP) Wall 8.25in
- 14 (210mm)
- Structural Ins. Panel (SIP) Wall 10.25in
- 15 (260mm)
- Structural Ins. Panel (SIP) Wall 12.25in
- 16 (311mm)

Roof Construction

- 1 Metal Frame Roof without Insulation
- 2 Metal Frame Roof with Code Compliant Insulation
- 3 Metal Frame Roof with High Insulation
- 4 Metal Frame Roof with Super High Insulation
- 5 Wood Frame Roof without Insulation
- 6 Wood Frame Roof with Code Compliant Insulation
- 7 Wood Frame Roof with High Insulation
- 8 Wood Frame Roof with Super High Insulation
- 9 Continuous Deck Roof without Insulation
- 10 Continuous Deck Roof with Code Compliant Insulation
- 11 Continuous Deck Roof with High Insulation
- 12 Continuous Deck Roof with Super High Insulation
- 13 Cool Roof - R11 continuous ins. over roof deck
- 14 Cool Roof - R15 continuous ins. over roof deck
- 15 Cool Roof - R20 continuous ins. over roof deck
- 16 Cool Roof - R30 continuous ins. over roof deck
- 17 Structural Ins. Panel (SIP) Roof 6.25in (165mm)
- 18 Structural Ins. Panel (SIP) Roof 8.25in (210 mm)
- 19 Cool Roof - R38 continuous ins. over roof deck
- 20 Cool Roof - R50 continuous ins. over roof deck
- 21 Structural Ins. Panel (SIP) Roof 10.25in (260mm)

Walls

Glazing Type

- 1 Monolithic Clear Low-e
- 2 Insulated Clear Low-e Hot Climate
- 3 Insulated Clear Low-e Cold Climate
- 4 Insulated Green Low-e
- 5 Insulated Blue Low-e
- 6 Insulated Grey Low-e
- 7 Insulated Bronze Low-e
- 8 Insulated Blue Reflective Low-e
- 9 Insulated Green Reflective Low-e
- 10 Insulated Grey Reflective Low-e
- 11 Insulated Bronze Reflective Low-e
- Super Insulated 3-pane Clear Low-
- 12 e
- PPG SB70XL/Clear
- 13 IG
- Translucent Wall Panel, (U-0.53, SHGC 0.36, Tvis
- 14 0.25)
- Translucent Wall Panel, (U-0.53, SHGC 0.51, Tvis
- 15 0.50)
- Translucent Wall Panel, (U-0.29, SHGC 0.19, Tvis
- 16 0.20)
- Translucent Wall Panel, (U-0.10, SHGC 0.06, Tvis
- 17 0.04)

Glass Amount

- 1 10%
- 2 -10%
- 3 25%
- 4 -25%
- 5 50%
- 6 -50%
- 7 Remove all

Building Design						Resultants														
Form	General		Lighting		Roof	Northern Walls			Total Annual Costs			Total Annual Energy				Potential Energy Savings (Kwh)			Potential Net Carbon Emissions (tons)	Potential Net Carbon Emissions in SUV's
	Alternate	HVAC	Lighting Efficiency	Lighting Control	Construction	Construction	Glazing Type	Glass Amount	Electric	Fuel	Energy	Electricity (Kwh)	Fuel (100 Them)	Carbon Emissions(ton)	Carbon Emissions in SUV's	Photovoltaic	Wind Turbine	Natural Ventilation		
Square	D	D	D	D	D	D	D	D	145,840	114,359	280,200	2,209,707	119,373	2,907	284	8,903	5,565	249,488	1,884	169
"	#1	2	1	1	2	2	3	3	138,676	129,500	268,178	2,101,161	135,175	2,855	259	9,903	5,565	213,279	1,789	160
"	#2	4	2	1	4	4	3	3	119,404	123,586	242,990	2,054,259	126,576	2,830	247	9,903	5,565	215,578	1,704	155
"	#3	5	3	2	10	4	7	5	146,377	95,467	241,844	2,217,847	99,652	2,803	254	9,903	5,565	280,552	1,701	154
"	#4	7	4	2	12	13	11	5	116,197	94,512	210,709	1,760,540	98,656	2,194	199	9,903	5,565	320,134	1376	125
"	#5	8	4	3	21	16	11	5	102,413	101,392	203,806	1,551,726	105,837	1,960	178	9,903	5,565	340,222	1,254	114

* Suv Equivalency: 15,000 miles driven annually; 14 miles per gallon (5.95 km per liter).

1 Therm is equal to100,000 BTU t is approximately the amount of energy needed to heat 1 pound (0.454 kg) of water from 39 °F (3.9 °C) to 40 °F (4.4 °C)

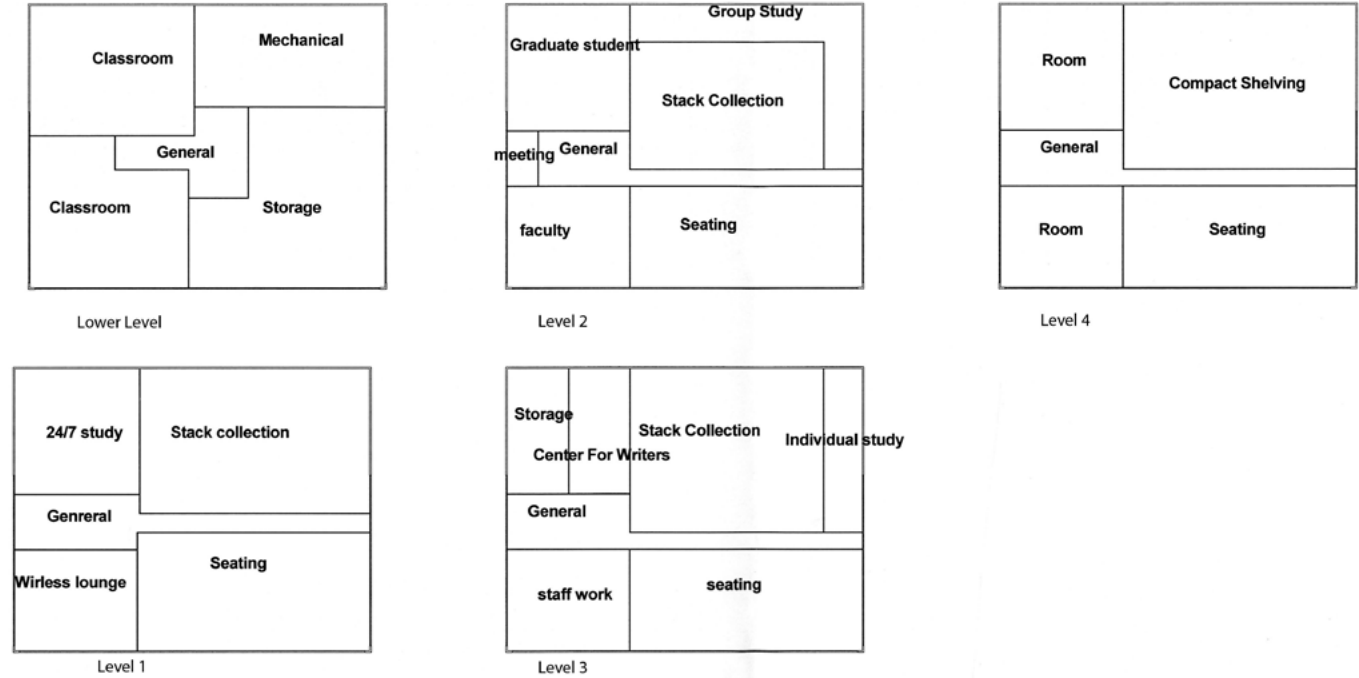
1 Kwh is equal to 1000 watt hours

D- Default

1	Base Run
Energy, Carbon and Cost Summary	
Annual Energy Cost \$303,458	
Lifecycle Cost \$4,133,093	
Annual CO ₂ Emissions	
Electric 3,481.6 tons	
Onsite Fuel 569.4 tons	
Large SUV Equivalent 368.3 SUVs / Year	
Annual Energy	
Energy Use Intensity (EUI) 61 kBtu / ft² / year	
Electric 3,473,712 kWh	
Fuel 98,168 Therms	
Annual Peak Demand 1,419.3 kW	
Lifecycle Energy	
Electric 104,211,360 kW	
Fuel 2,945,047 Therms	
Assumptions ⓘ	

2	Design Alternative
Estimated Energy & Cost Summary	
Annual Energy Cost \$236,334	
Lifecycle Cost \$2,946,469	
Annual CO ₂ Emissions	
Electric 1,649.1 tons	
Onsite Fuel 630.9 tons	
Large SUV Equivalent 207.3 SUVs / Year	
Annual Energy	
Energy Use Intensity (EUI) 61 kBtu / ft² / year	
Electric 2,085,607 kWh	
Fuel 108,778 Therms	
Annual Peak Demand 908.8 kW	
Lifecycle Energy	
Electric 62,568,210 kW	
Fuel 3,263,331 Therms	
Assumptions ⓘ	

SPACE LAYOUT USING PASSIVE SOLAR DESIGN



ECOTECH

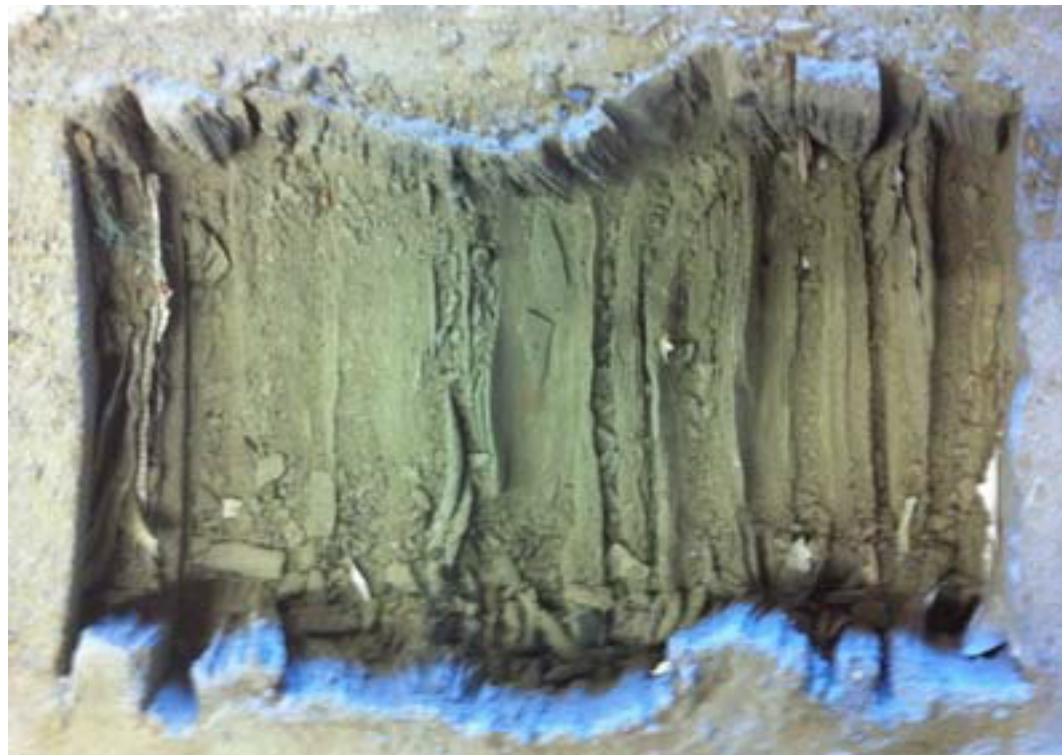


BUILDING AESTHETIC





BOOKS CAST IN CONCRETE



THE MAIN IDEA OF THE PROJECT IS TO CREATE A SPACE THAT HEIGHTENS ARCHITECTURAL EXPERIENCE BY DRAWING ONE IN, THEN SUBMERGING THEM WITHIN A WORLD OF KNOWLEDGE. THE METAPHOR OF A SINKING BOAT HELPS EXPRESS THE EXPERIENTIAL QUALITY OF THIS SPACE. THE ARTIFACT CREATED TO INSPIRE ARCHITECTURE CAPTURES ALL THE QUALITIES EXPERIENCED IN CAST CONCRETE: LAYERS, WEIGHT, AND HISTORY.

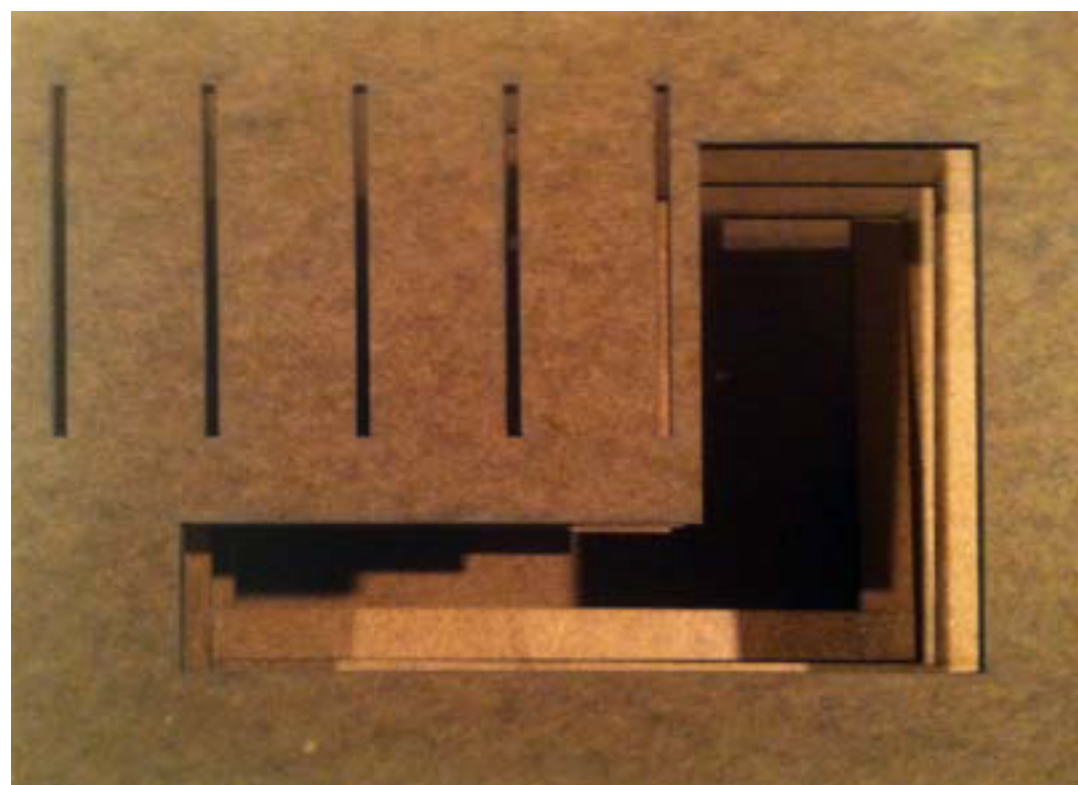


MOVEMENT THROUGH LAYERS





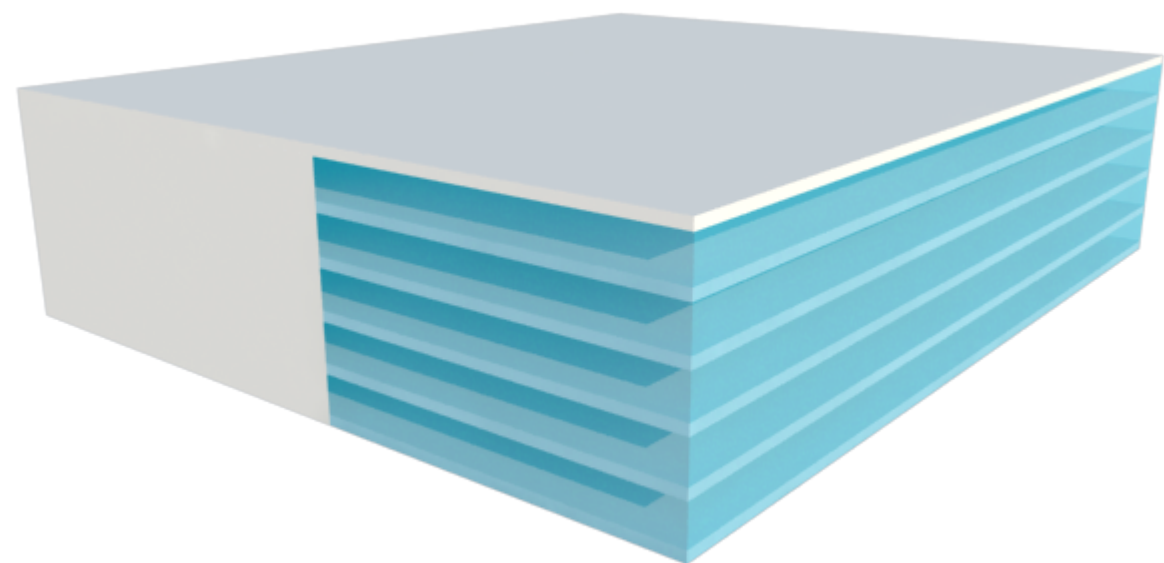
IMPRESSION FORM THE CAST CONCRETE



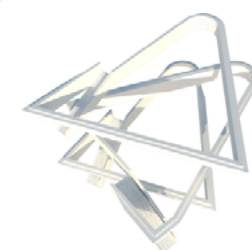
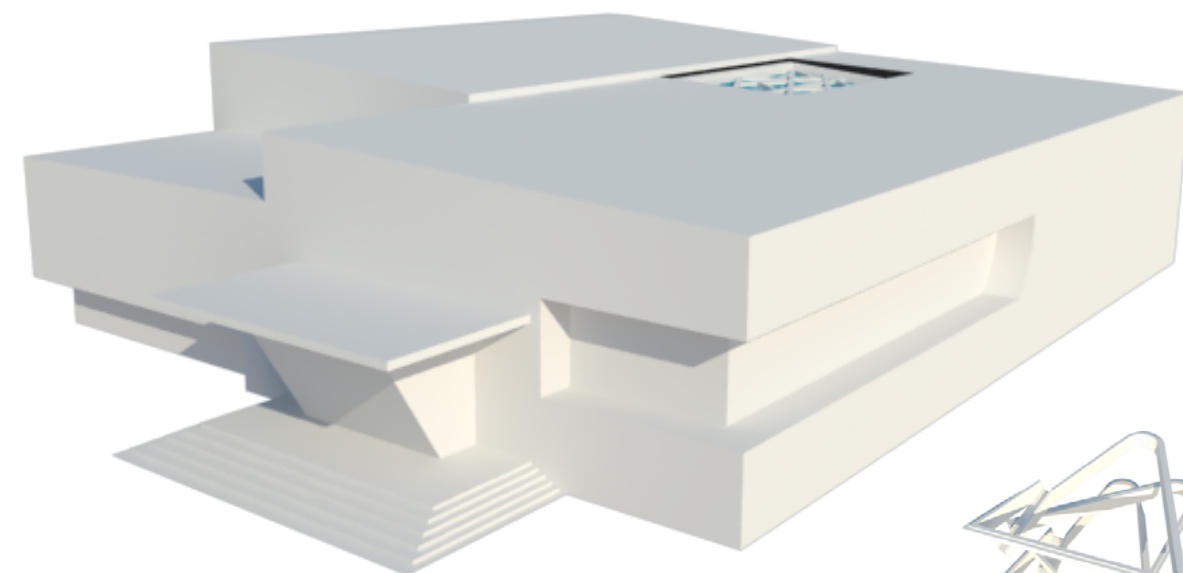
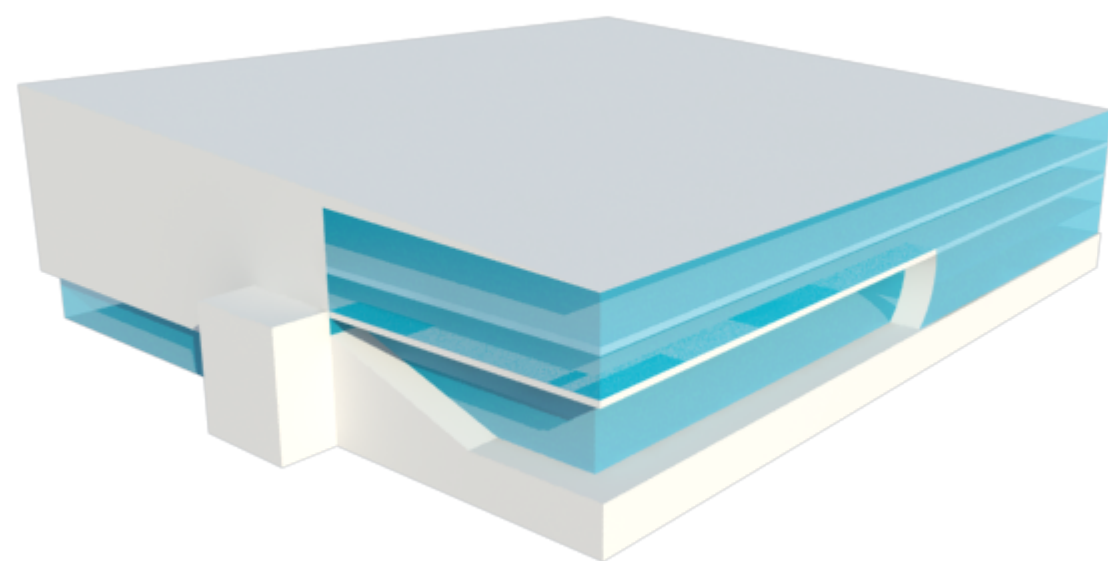
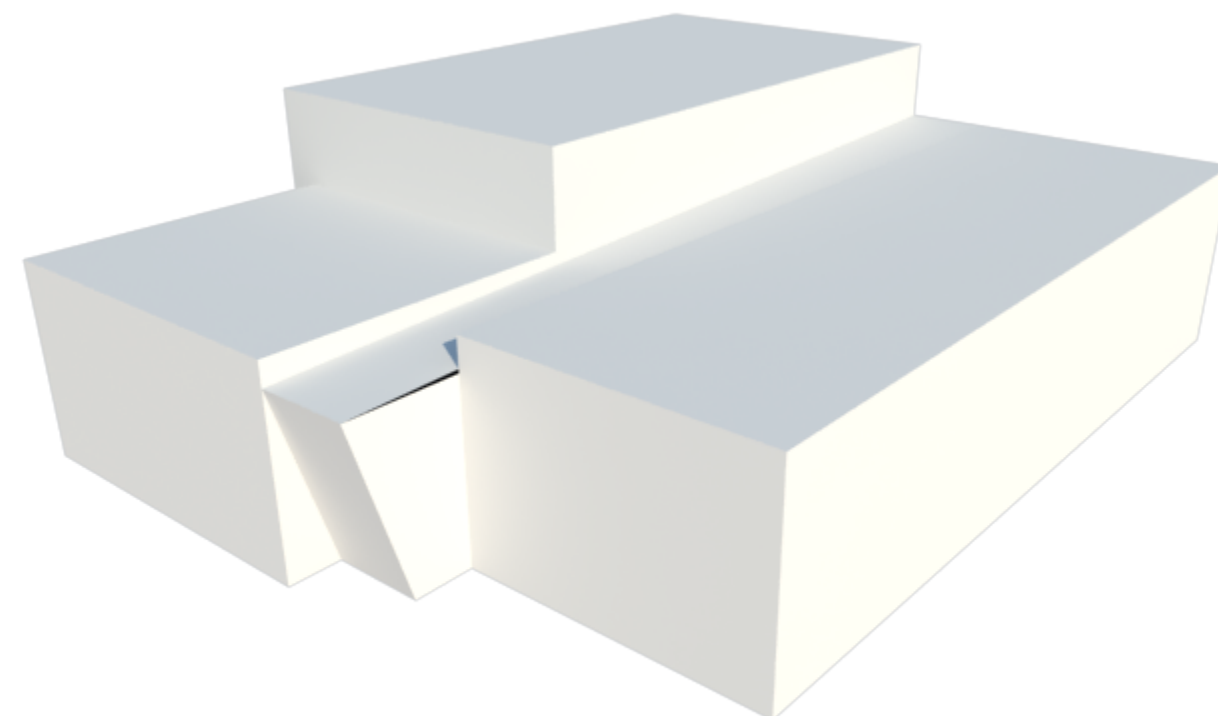
PLAN PERSPECTIVE

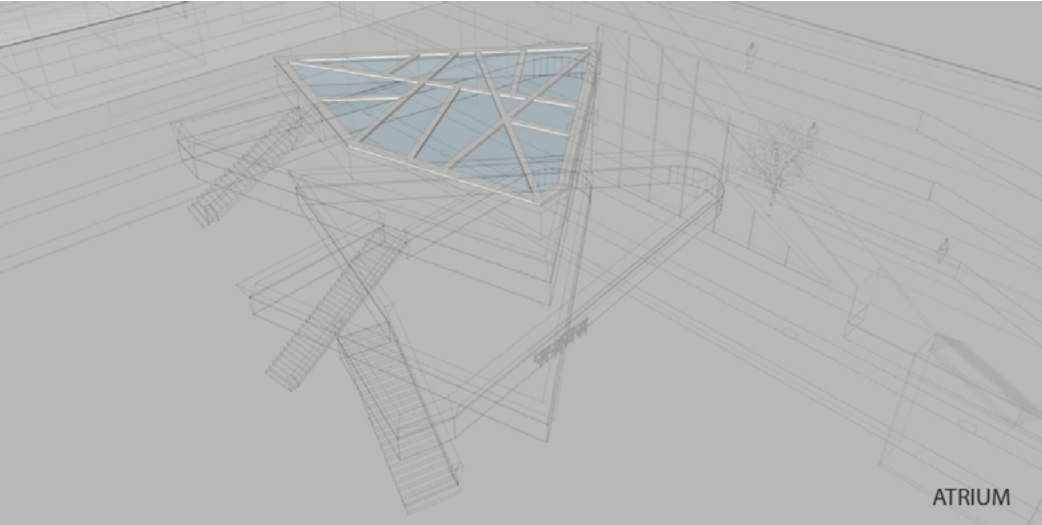


ATRIUM

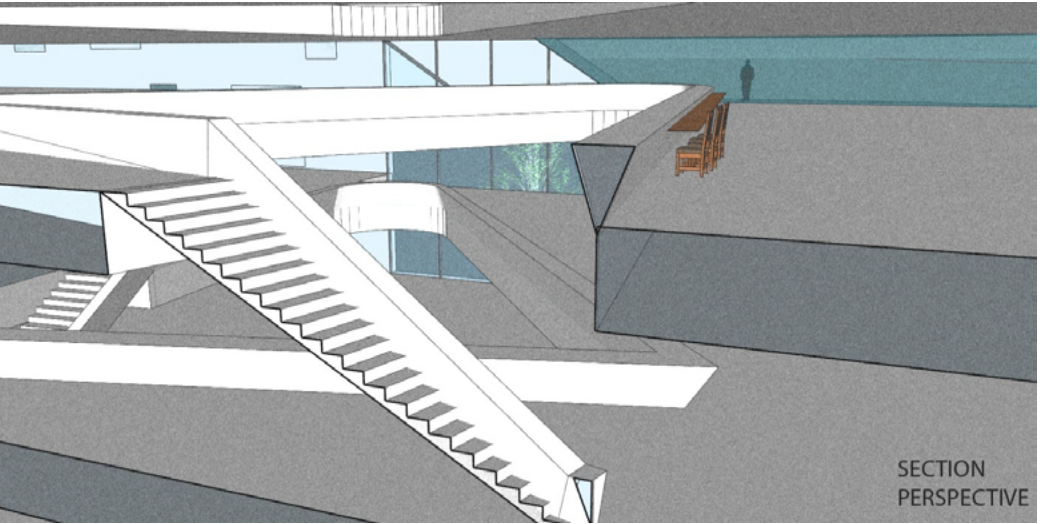


PROCESS

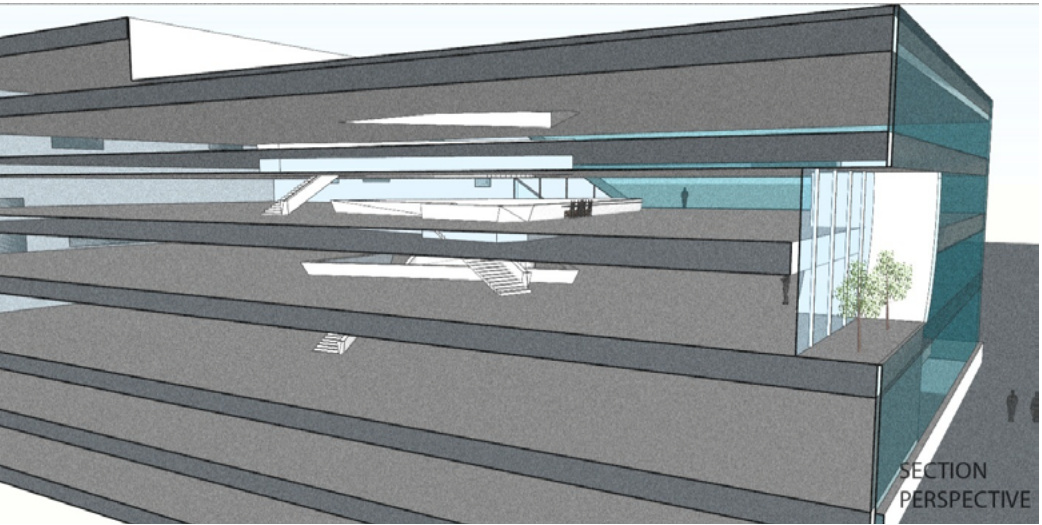




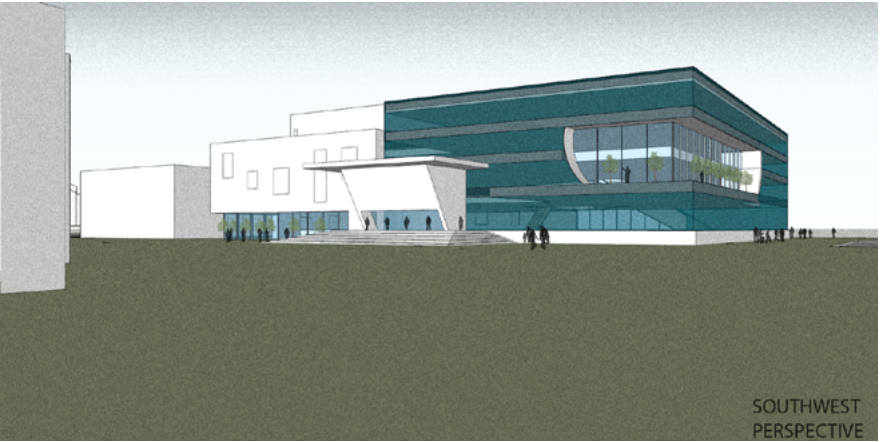
ATRIUM



SECTION
PERSPECTIVE



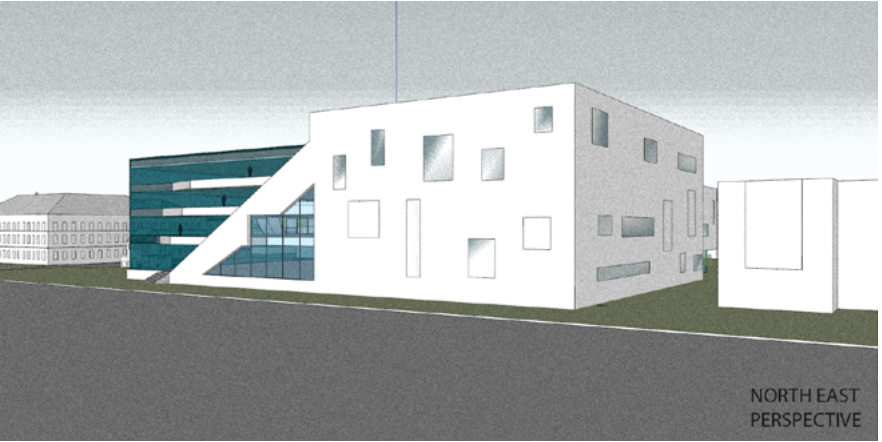
SECTION
PERSPECTIVE



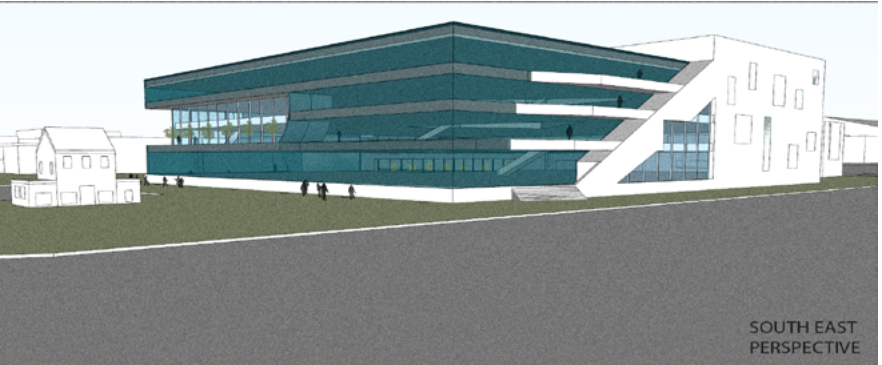
SOUTHWEST
PERSPECTIVE



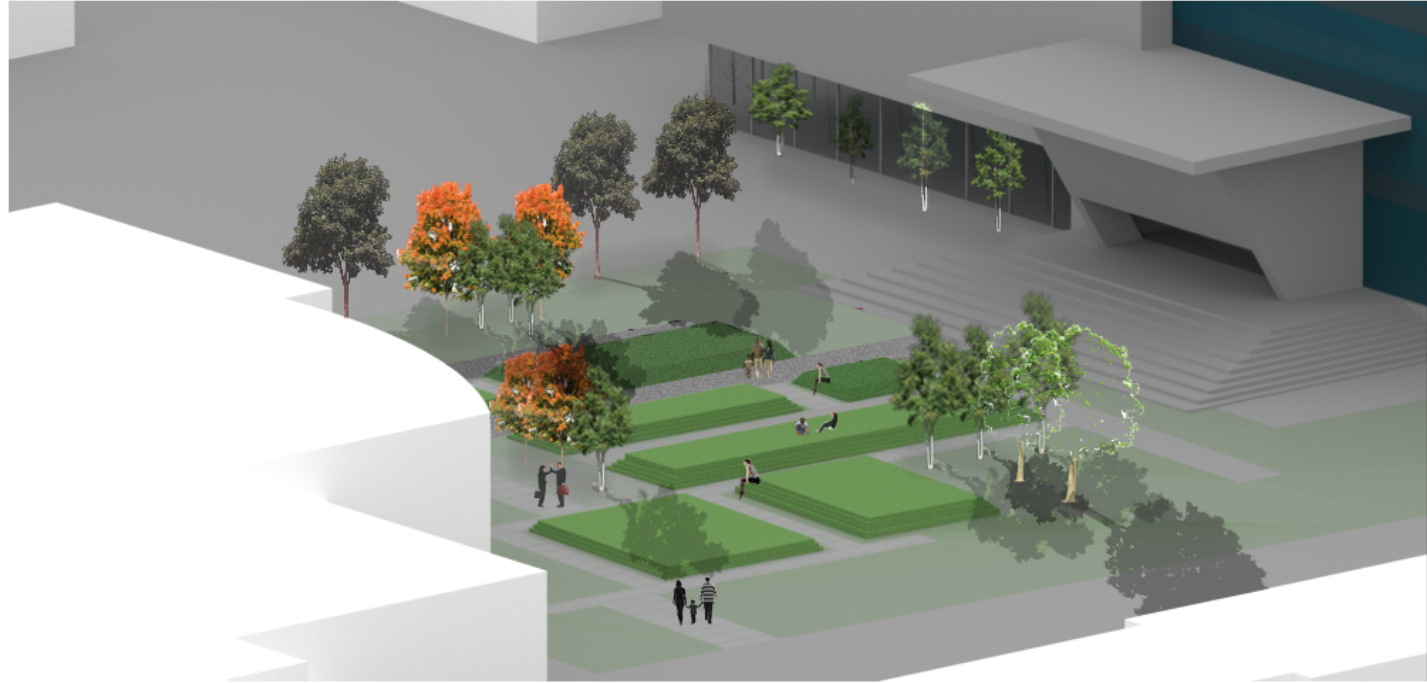
NORTH WEST
PERSPECTIVE



NORTH EAST
PERSPECTIVE



SOUTH EAST
PERSPECTIVE

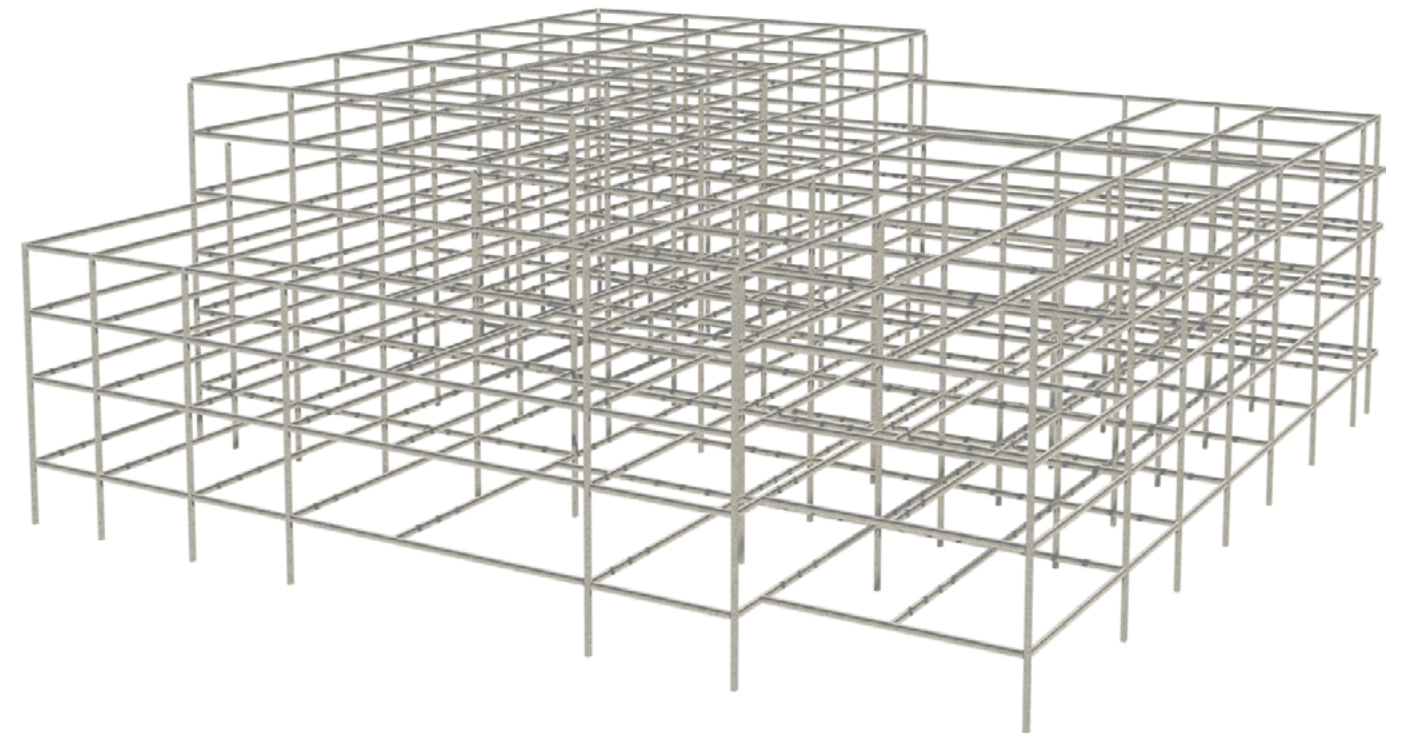


INTEGRATED LANDSCAPING



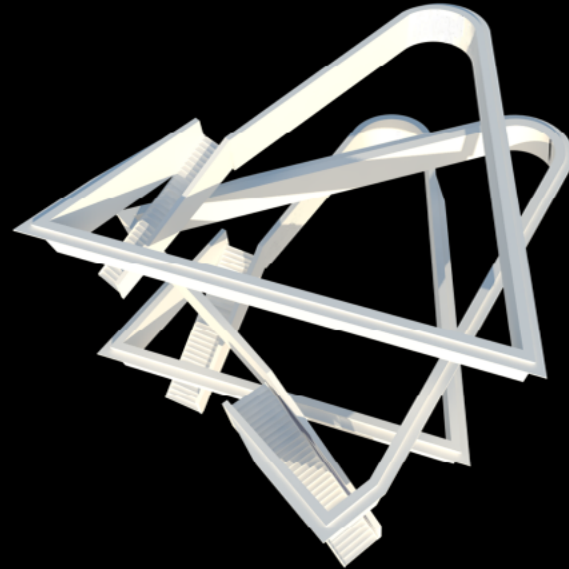
VERTICAL FARMING

BUILDING CULTURE & ECONOMICS

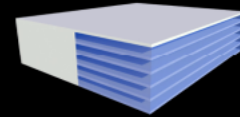


STRUCTURAL STEEL FRAMING

sustainable design includes the relation of these Four factors

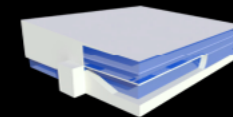


performance



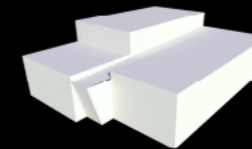
- _passive solar design
- _double skin facade
- _green roof
- _geothermal system
- _rainwater harvesting
- _photovoltaics
- _triple-pane glass
- _structural insulated panel

aesthetics



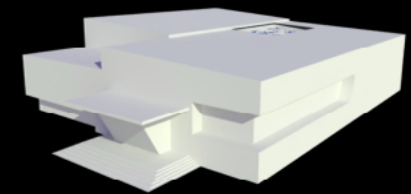
- _indoor/ outdoor space
- _interactive atrium
- _24/7 study lounge
- _interactive green roof
- _dynamic spaces

economics

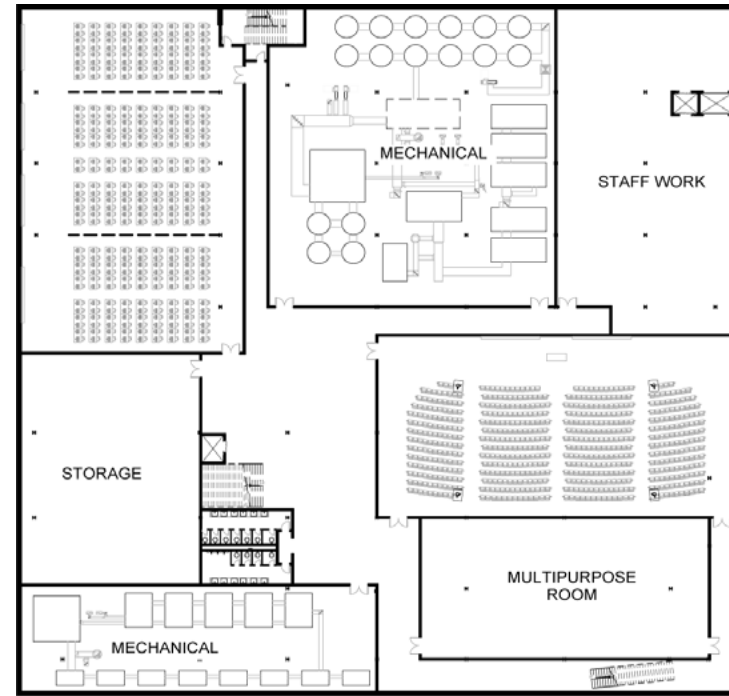


- _flexible space
- _basic form
- _steel columns and beams
- _precast hollow core floors
- _structural insulated panel

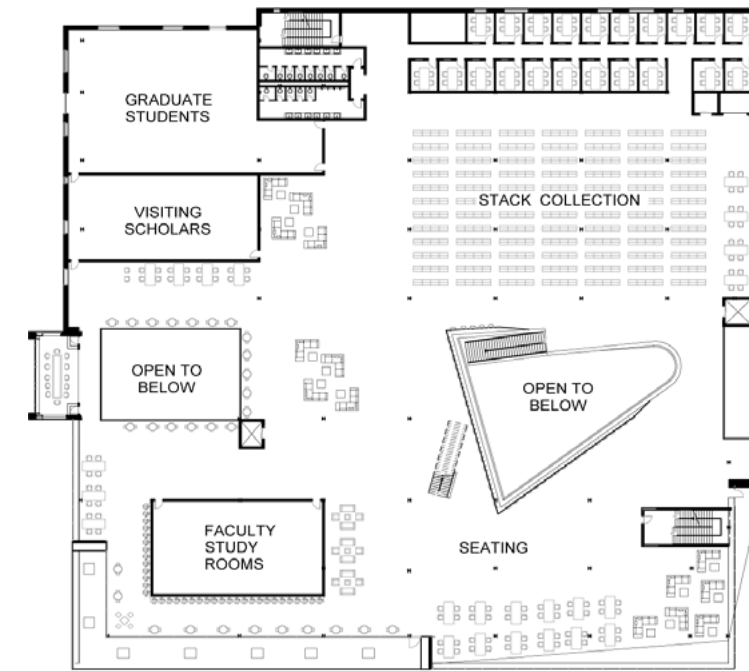
culture



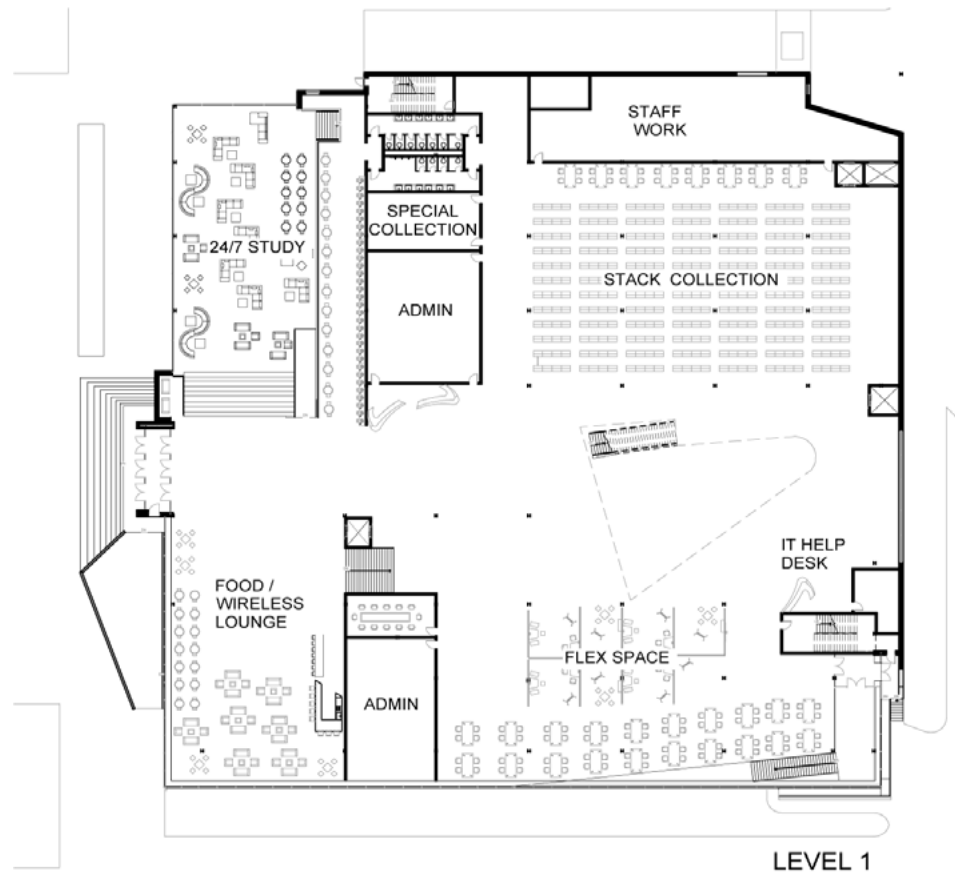
- _local material
- _green spaces
- _linear landscaping
- _warm colors



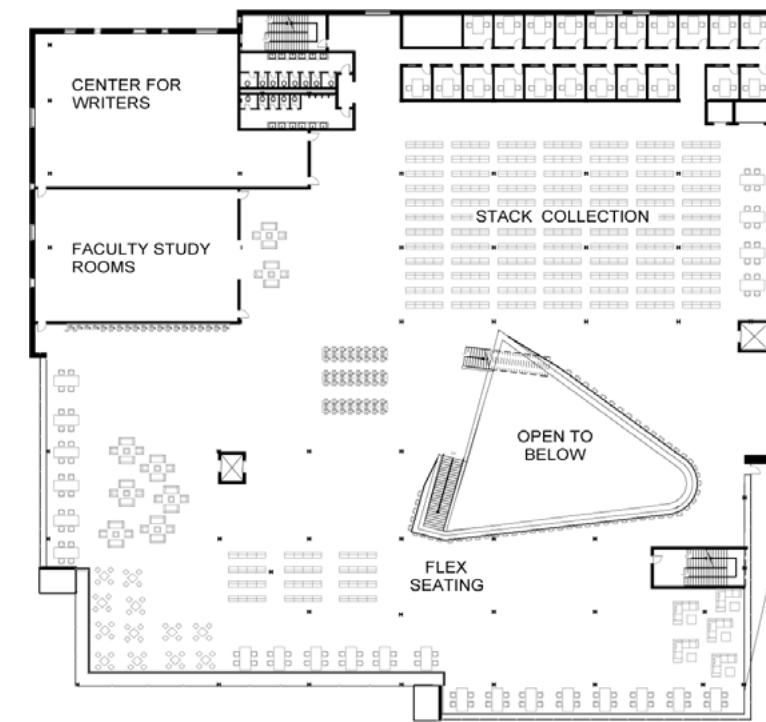
LOWER LEVEL



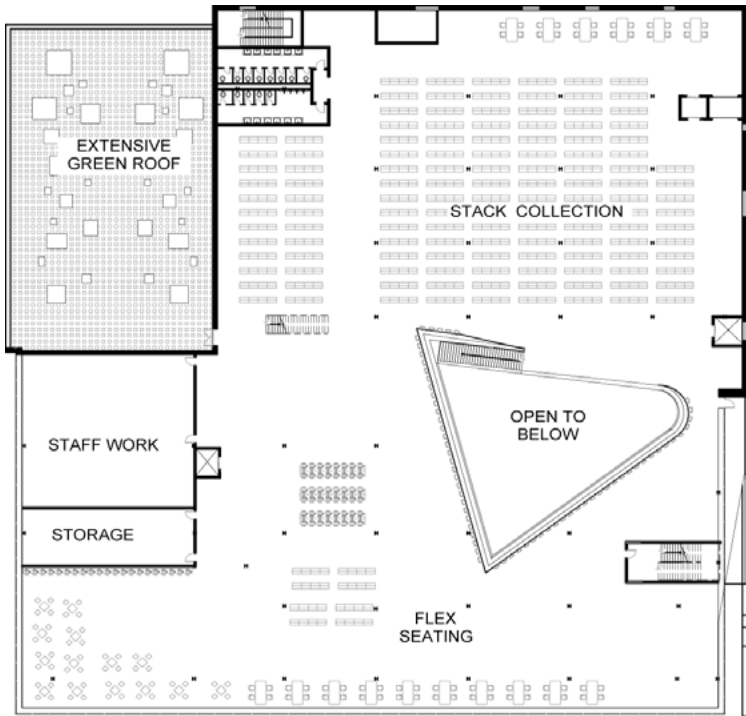
LEVEL 2



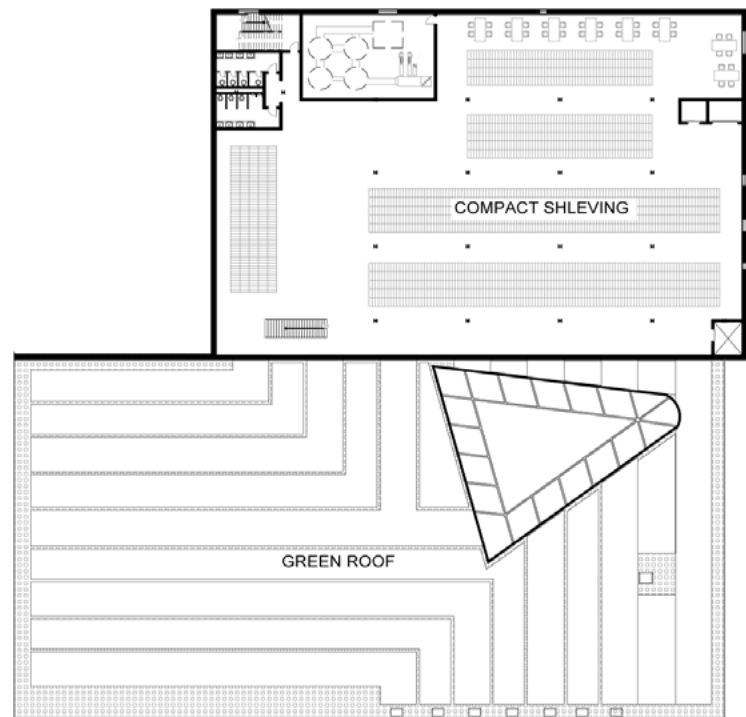
LEVEL 1



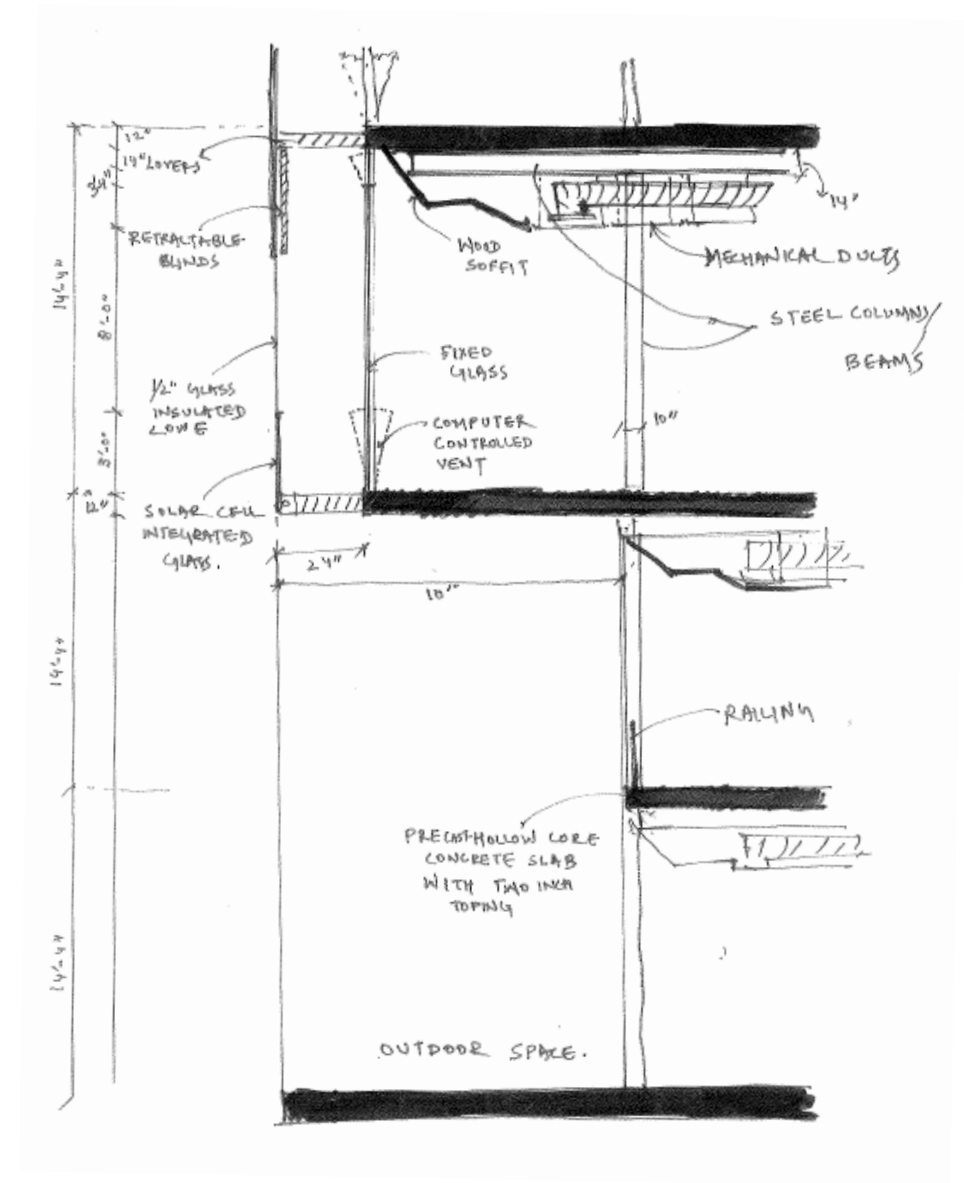
LEVEL 3



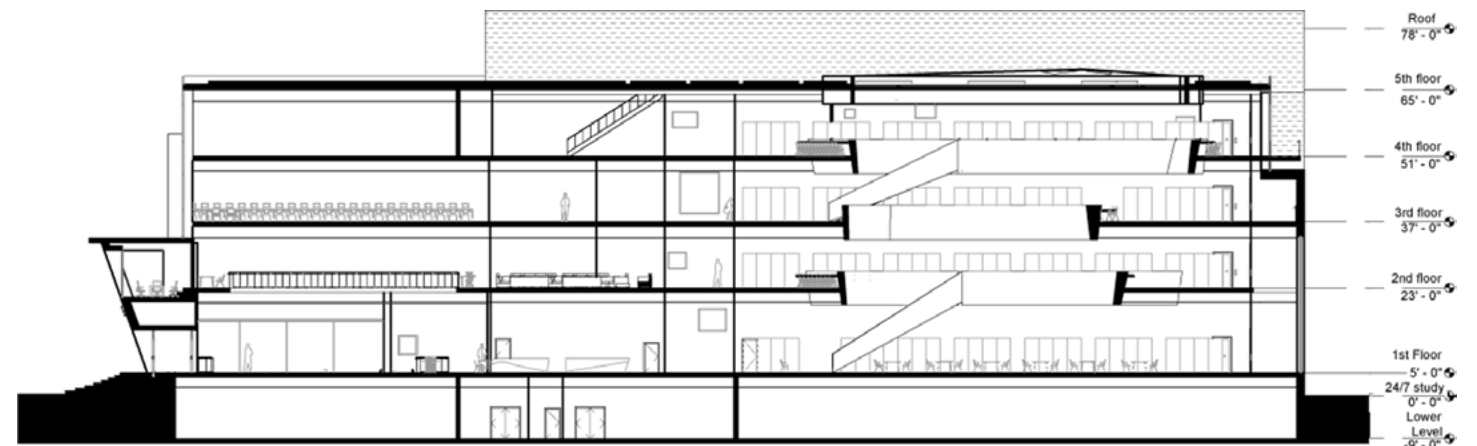
LEVEL 4



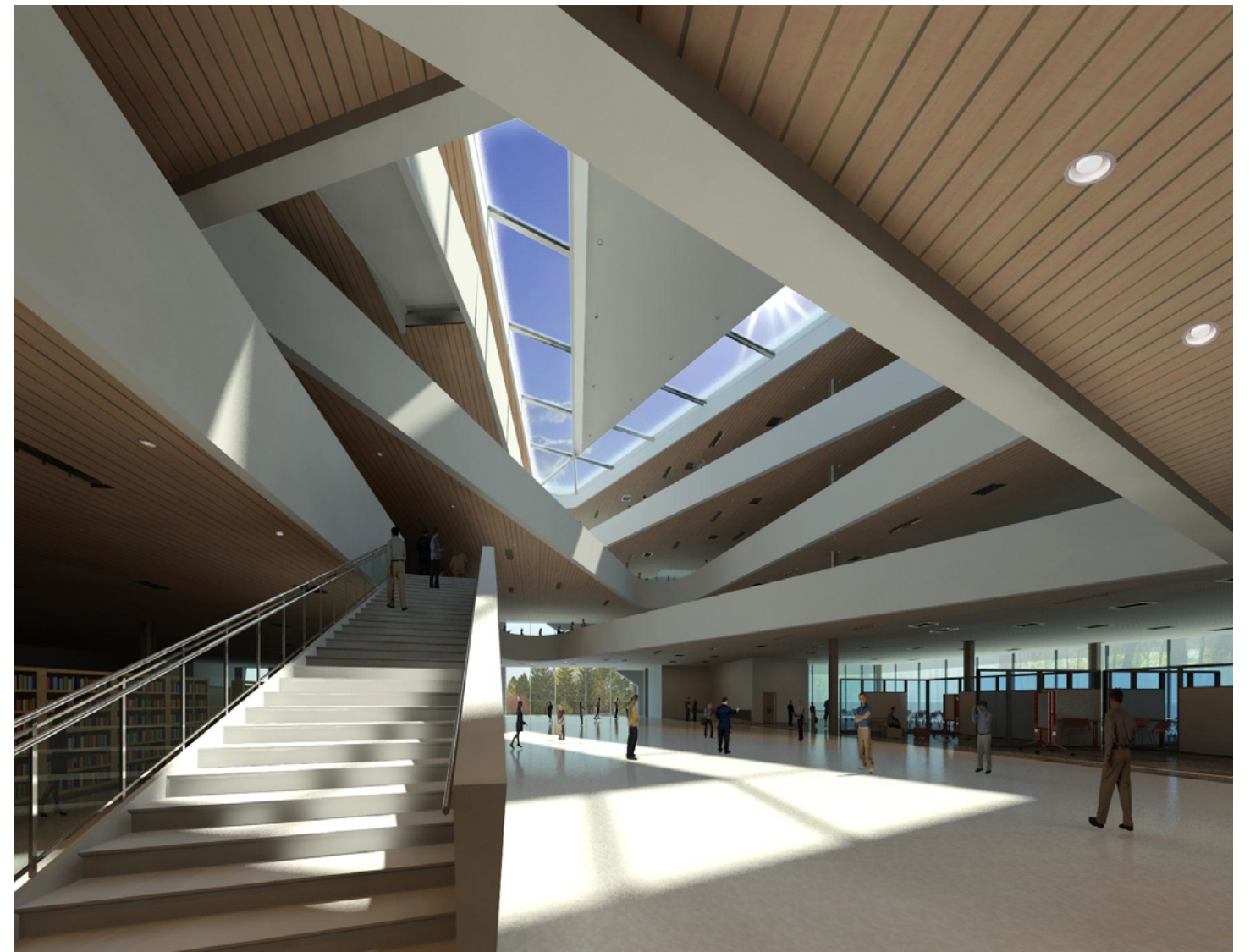
LEVEL 5



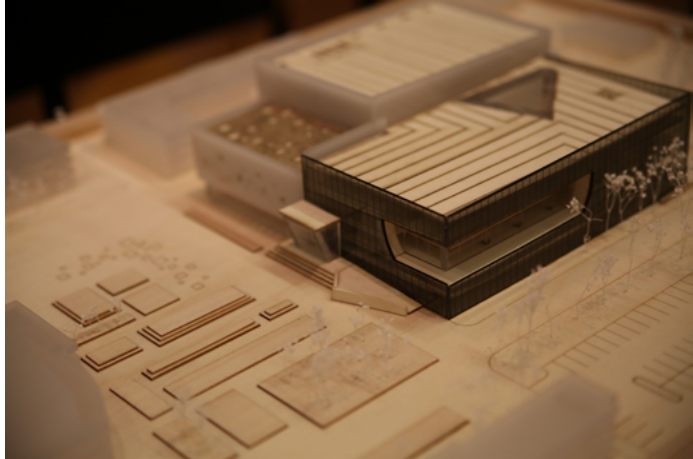
DOUBLE SKIN FACADE DETAIL



BUILDING SECTION







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KATHMANDU, NEPAL

AN IDEA THAT IS DEVELOPED AND PUT INTO
ACTION IS MORE IMPORTANT THAN AN IDEA
THAT EXISTS ONLY AS AN IDEA. BUDDHA

